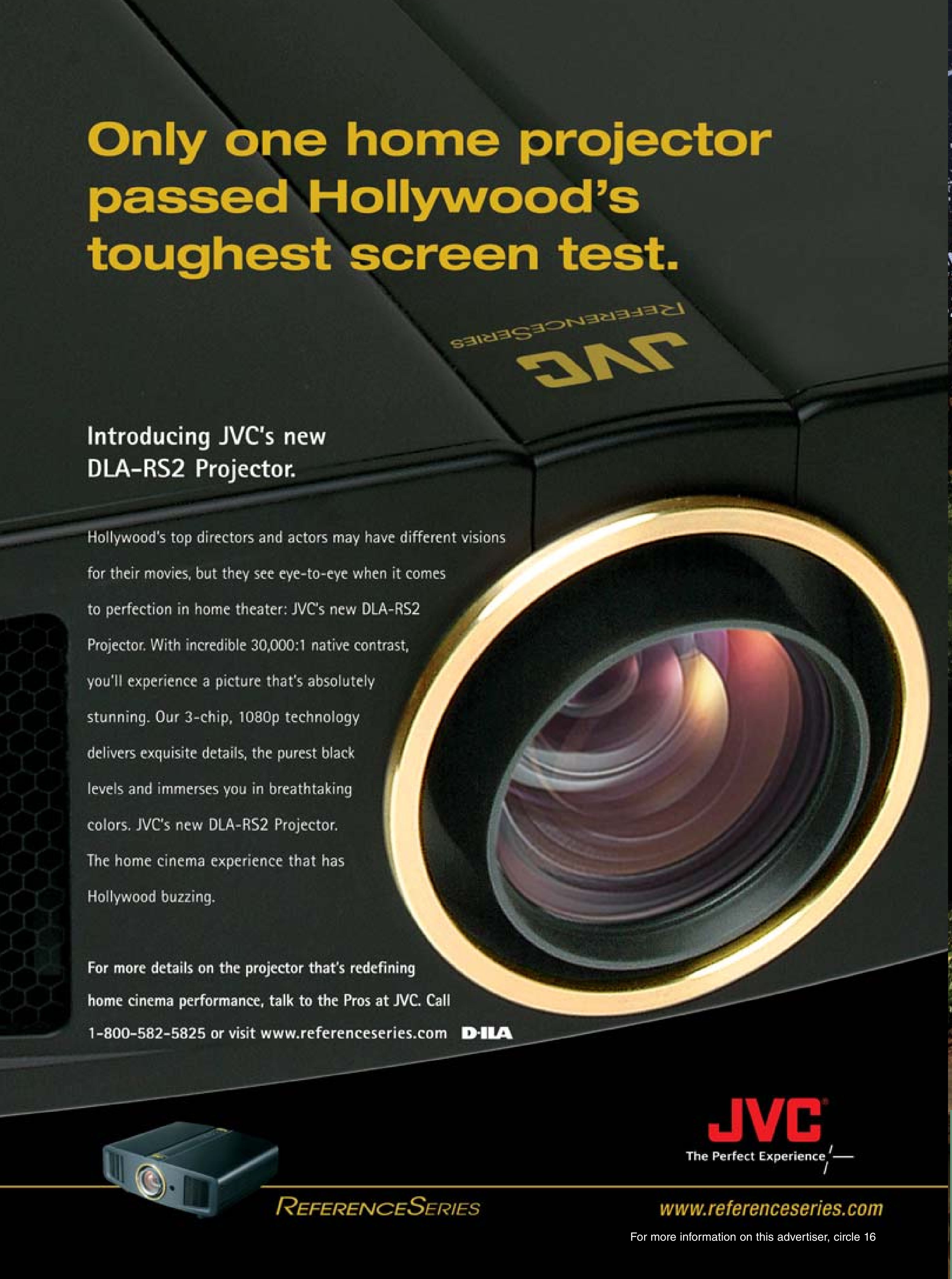

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The mission of *Ultimate Home Design* is to serve as a catalyst for homeowners to create demand for architects, designers, and builders to adopt the concepts and building practices that define human-centered, optimum-performance home design. *Ultimate Home Design* is aimed at broadening the segment of the American population that is paying closer attention to the products they buy, looking beyond price and branding to focus on other elements of the production and value chain. Increasingly homeowners want to support sustainable building practices that result in a higher living standard. *Ultimate Home Design* is for those homeowners who want to promote a broader shift in patterns of production and consumption by encouraging practices that better reflect their personal values. We are advocates for using products that reduce energy and use renewable, recycled content or otherwise environmentally preferable materials. An important part of our mission is to promote building practices that result in a substantial reduction in energy use for space conditioning, water heating, lighting, and appliance operation. Another important aspect of our mission is to promote construction practices that improve the indoor environment and reduce the risk of building-related illness. This translates to improved occupant health and comfort by improving thermal comfort; natural lighting and electric illumination; and controlling humidity, odor, noise, and vibration.

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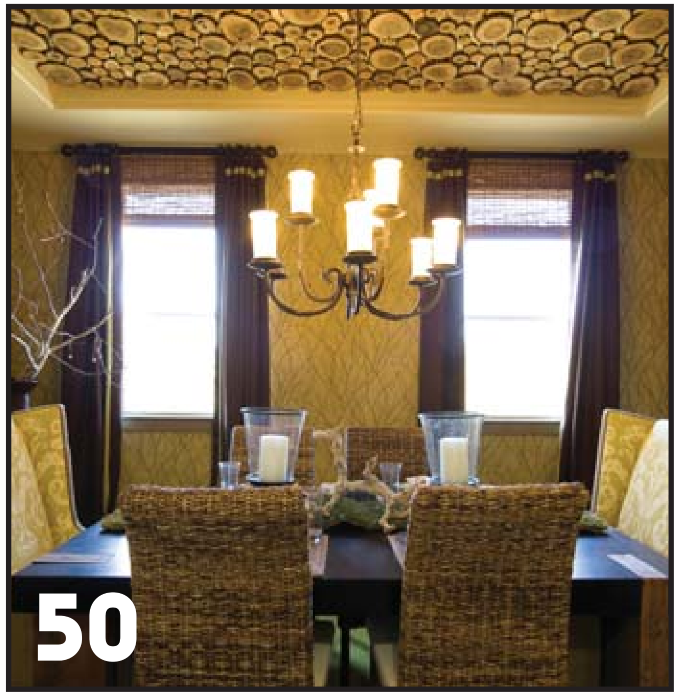
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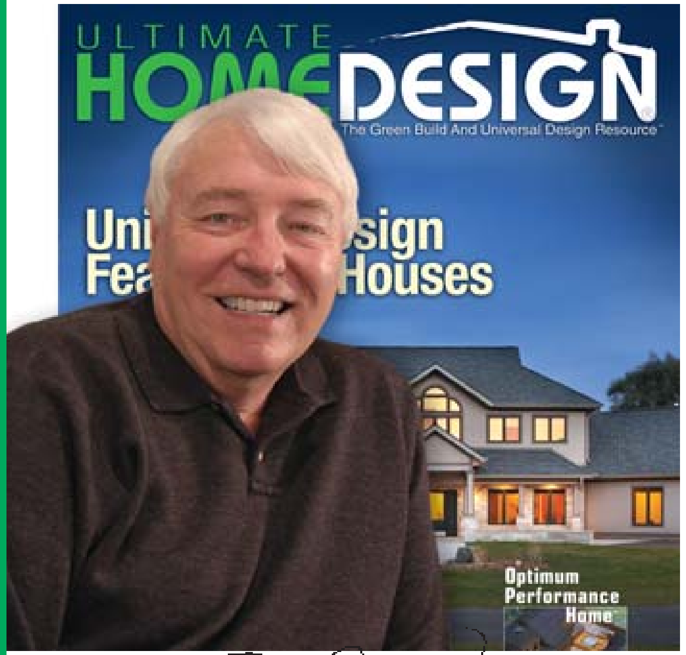

"Green" Building

As reported in the pages of *Ultimate Home Design*, new energy-efficient features and environmentally friendly designs are increasingly being used during the construction of homes. Many industries are jumping on the "green" bandwagon—automakers are designing hybrid and electric cars that use less fuel or no fuel at all, retailers are selling products made out of recycled materials, and so on. This is in response to the heightened interest on the part of nearly all consumers in the idea of sustainability and "green" products.

There is no doubt that "green building" is an exploding market with an increasing number of home builders adhering to or preparing to adhere to "green building" guidelines and standards. One definition of "green building" is the process of using both energy-efficient and environmentally sound practices in the design and construction of homes. There are so many different aspects of green building, but some of the key concepts include using renewable resources during construction, reducing the amount of waste on construction sites, incorporating energy-efficient features and appliances (e.g. solar water heating systems, on-demand hot water heaters, ENERGY STAR® appliances, rainwater catchment, etc.), and creating healthy indoor air quality.

A heightened sense of environmental responsibility and "green" practices are in the sights of almost every American home builder, from those who are constructing zero-energy custom homes to those who are just beginning to consider whether their markets are ready for ENERGY STAR-rated homes. An important responsibility for such builders is to ensure that energy-efficient "green" homes are not mutually exclusive from safe, decent, and affordable housing.

With this caveat, the National Association of Home Builders (NAHB) has weighed in with the U.S. House of Representatives regarding the proposed GREEN Act (H.R. 6078), a bill to encourage energy efficiency and conservation and development of renewable energy sources for housing, commercial structures, and other buildings, and to create sustainable communities using government incentives to encourage the construction of affordable green homes. NAHB leaders also participated on a panel organized by the National Housing Conference on similar measures that would enable more energy-efficient features to be available in the workforce and in affordable housing. The NAHB's goal is to deliver more energy efficiency and sustainability to our nation's housing programs. But rather than support a government mandate, the NAHB supports voluntary, market-driven programs to keep the price of "green building" low. The NAHB reasons that as more and more materials become available, home builders and their subcontractors will add to their skill set and home buyers will decide they are ready to take the plunge.

Both government subsidies that enable targeted "affordable" green building projects to be completed and traditional market-rate homes offerings will continue to move the "green movement" forward. At some point, the term "green" will become synonymous with normal market-rate home design and construction. At present, the "green movement" is in the phase of "proof of concept," and the experience gained in a variety of projects will enable architects, designers, and builders, as well as homeowners, to access the full effects of those projects and their merits.

It is this assessment that *Ultimate Home Design* is engaged in, on an issue-by-issue basis, and our own "proof of concept" is documented in the design and construction of the first Optimum Performance Home®.

In this issue of *Ultimate Home Design*, Part XVI is the fourth article on the construction phase of the first Optimum Performance Home at The Sea Ranch, California. This in-depth series provides comprehensive insight into what's involved in building your own "green" and sustainable, and "biophilic" and "universal" designed home. The documentation of the building of this U.S. Green Building Council Leadership in Energy and Environmental Design (LEED®) home is a work in progress, facilitated with construction site time-lapse high-definition images and streaming video accessible through our Web site, www.ultimatehomedesign.com.

There are also other interesting and informative articles covering "green" built and "universal" designed homes featured in the issue.

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Breaking Ground

Recent News, Reviews, And FAQs

Issue 16, August 2008 Volume 3, Number 4

North America's Largest Solar Event: Top Industry Issues In The Spotlight

Solar Power Conference & Expo 2008 will take place October 13 through 16 at the San Diego Convention Center. Organized by the Solar Electric Power Association (SEPA) and the Solar Energy Industries Association (SEIA), the event is expected to attract a record 12,000 professionals from more than 70 countries and 400 exhibitors from 14 countries. Besides top vendors presenting state-of-the-art solar energy technologies and services, Solar Power 2008 features more than 60 conference sessions and workshops covering the latest market, policy, finance, and technology issues, as well as a world-renowned CEO Panel plenary session. The first confirmed keynote speaker for this year is Bob Greifeld, Chief Executive Officer of the NASDAQ OMX group. Greifeld will address conference attendees on global market conditions, the outlook for IPOs, and Wall Street's role in the future of the solar industry.

"Every year since its inception five years ago, Solar Power Conference & Expo's top-rated keynote speakers have reflected the critical issues of interest to our attendees in the given year. Greifeld's 20-year history as a technology entrepreneur and his successful leadership of the world's largest exchange will bring invaluable insight to the Opening Plenary," said Julia Hamm, Chair of Solar Power Conference & Expo and Executive Director of SEPA. "We look forward to Greifeld's view from the Street, including his perspective on the investment climate, market mechanisms, and key issues for continued industry growth."

In addition to the full array of conference sessions, extensive exhibits, and industry networking opportunities, the featured CEO Panel plenary session promises to deliver stimulating dialogue on all the exciting and fast-changing market conditions. The panel will feature top executives from the most important players in the solar marketplace, including manufacturers, project developers and contractors, electric utilities, and large buyers, such as big box stores. Solar Power 2008 will encompass the full range of solar energy technologies, including photovoltaics, concentrating photovoltaics, concentrating solar power, and solar hot water and space heating and cooling. The event also features an online career center to support the recruiting of qualified professionals—a top concern of an industry experiencing record growth.

A new online registration function will allow professionals to filter and sort through exhibitor and session content to create customized personal floor plans and itineraries. These online tools will allow users to make the most of their time in San Diego, navigating the large show floor and comprehensive conference agenda with ease.

Another unique feature of this year's event is an expanded focus on consumers. Solar Power 2008 Conference & Expo, a business-to-business event, has partnered with the California Sustainable Energy Center (CCSE) to coincide with San Diego's annual Solar Energy Week. This combination creates a comprehensive, week-long schedule addressing both professional and consumer solar interests. Activities for the public will include Family Solar Day on October 12, a public opening of the Solar Power 2008 exhibit hall on the evening of October 15, and the Tour of Solar Homes on October 18.

Last year's event sold out in advance, so organizers encourage early registration to guarantee participation. For more information, speaker and session updates, and to register visit: www.SolarPowerConference.com.

U.S. Government Places Moratorium On New Solar Projects On Public Lands

The federal government has placed a moratorium on new solar projects on public land administered by the Bureau of Land Management (BLM) while it studies the environmental impact of both photovoltaic and solar thermal installations. The BLM expects the study to take about two years. According to the announcement, the affected proposed projects would cover more than one million acres and have the potential to power more than 20 million homes.

The BLM cited a number of concerns for the decision:

- The impact of construction and transmission lines on native vegetation and wildlife, such as the effects of construction on the desert tortoise and Mojave ground squirrel in California.
- Concentrating solar plants may require water to condense the steam used to power the turbine.
- Reclamation of the area and habitat restoration after the plants reach the end of their 20 to 30 year lifespan.

The moratorium is limited to federal land, often in remote locations, which present significant transmission loss challenges apart from their environmental impact when distributing power to urban users. The result may shift efforts to the more practical and efficient approach of municipal power plants.

Future Municipal Solar Power Plants

The future of urban solar power generation may be 2- to -10-megawatt (MWatt) power plants located close to power users on the periphery of cities. Such facilities would require approximately 10 acres to serve a city of 1,000 homes, or one acre per 100 homes.

Nanosolar's CEO, Martin Roscheisen, provides a description of the advantages of these relatively small plants on the company's Web site (www.nanosolar.com):

"At Nanosolar, we believe very much that meaningful scale for solar will come foremost from utility-scale solar power plants, in particular from municipal solar power plants of 2 to 10 MW in size. These are rows of solar panels mounted onto the ground of free fields at the outskirts of towns and cities, feeding electricity directly into the municipal power grid.

"A 2 MW municipal solar power plant requires about 10 acres of land to serve a city of 1,000 homes—that's acreage generally easily available at the outskirts of any city of such size in even the most developed countries. Have one of these in each of several hundred cities, and a gigawatt of power is delivered—locally to where the power is needed and in a digestible size each.

"In a municipal solar power plant, solar panels are mounted onto rails above the ground so that grass and flowers can continue to flourish in between and below the rows of panels. Care is taken that sufficient amounts of rainwater can drop through between adjoining panels so that the flowers and organisms below are not starved. In fact, in dry regions, the solar panels even benefit the ecosystem by increasing the moisture level in the soil.

"Municipal solar power plants integrate very naturally into the existing landscape as well as the existing electricity grid. By feeding power directly into the (local, medium-voltage) distribution grid, they avoid the (long-haul, high-voltage) transmission grid, which is expensive to build and expand, and they also avoid the expense of a substation for down-transforming transmission voltage to municipal voltage. It's a form of distributed generation, but at the wholesale level, and it has been determined (using CPUC methodology and data) that there is a locational benefit of about 35 percent over wholesale power cost. These are real dollars that providers of wholesale-distributed power and rate payers can split in a win-win cost advantage.

"In any region with a decent amount of sunshine, there is no more economic way of reliably providing municipal power during the day than through a municipal solar power plant. That's because municipal solar power plants combine the locational benefit of avoided transmission with the time-of-day benefit of solar and the economics of scale.

"Ground-mounted solar power plants are installed in industrially streamlined ways, with specialized tractors deploying standardized substructure components, according to standard system block designs, to achieve optimal cost efficiency.

"While rooftops are surely a good application too for solar panels, it is a business that's difficult to scale rapidly in a truly meaningful way. Crawling onto rooftops and mounting solar panels in compliance with building codes is fundamentally always a somewhat less-efficient proposition.

"In fact, municipal solar power plants are one of the most rapidly deployable forms of power: whereas it takes 10 to 15 years to get a new coal plant done (if ever, given their carbon risk) or 5 years for a concentrating solar-thermal plant (also requiring a connection to the transmission grid), a municipal solar plant can be completed in as little as 12 months.

"Furthermore, a unique feature of photovoltaic power plants is that they utilize power inverter electronics with increasingly intelligent features. Enlightened utilities around the world are now recognizing these as a very good way to manage and improve grid power quality. This is especially a point of pain at the outer branches of the electric grid where power quality is hard to manage otherwise.

"Municipal solar power plants offer an attractive level of efficiency, scale, and benefit in solar. This is just not yet known very well to the public in the United States and in California, where this segment has been stifled not least by the policy gap that exists in California between the state's Renewable Portfolio Standard (geared toward >20 MW systems) and the California Solar Incentives (designed for <1 MW systems).

"But towns and cities throughout Europe and Asia have already proven the concept, and more and more—in fact, increasingly, entire counties—are now implementing plans to go 100 percent renewable based on a mix of solar and biofuels. It works, it is economic, and it is possible now. It is a silent revolution going on that the press rarely reports about.

"The amount of activity going on behind the scenes in readying technologies, sites, and financings for such is tremendous, and this will become very visible to the public in many locations in the United States in 2010. There is a reason why one of the world's largest power producers invested in Nanosolar.

"But now is the time for cities and counties to lay the administrative foundation for having their own power, 100 percent renewable, if they care to make a difference by then."

Hawaii First State To Legislate Solar Energy

Governor Linda Lingle has signed into law a bill to increase the use of one of Hawaii's most abundant renewable energy sources and reduce dependence on imported oil. With the Governor's signature, Hawaii becomes the first state in the nation to require the installation of solar water heating systems on new single-family homes.

"This solar power legislation is another important step in our long-term plan for energy independence in Hawaii," said Governor Lingle. "In addition to solar, it is critical that we continue to develop innovative energy solutions that capitalize on our natural renewable resource advantages in order to achieve our goal of having 70 percent clean energy in Hawaii by 2030."

The measure prohibits the issuing of building permits for single-family homes that do not have solar water heaters starting January 1, 2010. Exceptions will be allowed in cases where homes are built in locations with low rates of sunshine such as forested areas, where the life-cycle analysis of the solar system proves to be cost-prohibitive, or if the dwelling uses a substitute renewable energy source.

The bill, which becomes Act 204, would also allow homebuilders to use gas-on-demand water heaters, which use a small tank to heat up water quickly when the faucet is turned on, if the home includes another gas appliance.

Under the measure, the Public Utilities Commission is tasked with setting standards for the water heaters, and the counties would establish implementation procedures.

There are certain provisions and language in the bill that are of concern, including eliminating the existing 35 percent tax credit for solar water installations for residential developers of single-family residences starting January 1, 2009.

The bill also appears to eliminate the tax credit for owners of existing residential single-family homes after January 1, 2010. While this may not have been the intent of the bill, the language implies that existing homeowners would have had to seek a building permit to install a solar water heater prior to January 1, 2010 to claim the tax credit.

The bill also clouds whether existing single-family residences can obtain a 20 percent wind-power tax credit and a 35 percent photovoltaic tax credit for new single-family structures built in 2009 and for existing single-family residences after January 1, 2010.

The Lingle-Aiona Administration will introduce legislation in the next legislative session to clarify this language and ensure the tax credits for solar water, wind, and photovoltaic systems for new single-family homes built in 2009 continue as well as ensuring access to this important tax credit for existing residences after January 1, 2010.

California's Housing Market Finds Itself In Dire Straits—A Report Presented At The PCBC

While the underlying demographics for housing remain strong in California and are expected to gain even greater strength as its population continues to grow, the immediate outlook is grim and the industry remains in dire straits, representatives from the California Building Industry Association (CBIA) told the media at a June 25 news conference in San Francisco during the annual Pacific Coast Builders Conference (PCBC).

The state's homebuilding industry will languish well into next year, with some areas performing noticeably better than others, and the marketplace could sustain even more damage if lawmakers fail to move forward with stimulus legislation aimed at propping up the economy by stabilizing housing conditions.

"Without reforms being considered right now in Sacramento and Washington, D.C., I fear many more builders will go out of business and many more jobs will be lost," said Ray Becker, a Bay Area developer and this year's chair of CBIA. "Equally important, this attrition will make it even more difficult to ramp up production when the market finally does start to turn."

In a sharp plunge from peak levels averaging about 210,000 units in 2004 and 2005, this year's construction levels are projected to sink below 80,000 permits, to the lowest level since those figures first started being compiled in 1954, noted Robert Rivinius, the association's President and CEO.

"We need 230,000 starts a year just to meet our growing population," Rivinius said.

Despite the current housing slump, California's population will grow by 490,000 this year alone, said Alan Nevin, CBIA's chief economist, reaching 38 million and advancing to 40 million by 2011, not counting residents who are illegal immigrants.

"It doesn't appear to make much difference whether there are jobs here or housing here," Nevin said. "We just keep growing."

On the employment front, the state's residential real estate sector clearly has

borne the brunt of the economic downturn, with nearly 200,000 home building-related jobs lost during the past two years — before counting the negative impact on furniture distributors, interior decorators, landscapers, and others who increasingly have been going out of business.

"During the past two years, the state reported a loss of 181,300 construction, finance, and insurance jobs," Nevin said. "But in fact, the job losses related to construction have been much more severe, as the multiplier effect of the construction industry is higher than any other."

He added that the downturn has also crippled state and local government budgets due to the lost revenue from taxes and development fees.

On the plus side, Nevin said, the state's unemployment rate is barely up, thanks to ongoing growth in such key areas as manufacturing and tourism. Unlike the Midwest, which is suffering from systemic economic problems, California's housing market overall is poised to move up rapidly once it bottoms out.

Nevin said that he has had to pare down his housing forecast from fairly upbeat levels foreseen at the start of the year because of "double trouble" stemming from last summer's subprime mortgage meltdown and the accelerating price of fuel.

Single-family permits in 2008 now are likely to slip to 38,000, down from a peak of more than 155,000 in 2005; and with the condo market at a standstill, multifamily construction will fall to 34,000 from a peak of less than 62,000 in 2004, with activity generated by "apartment builders buying condo sites and building apartments on them."

The sharp home price declines being posted on various indexes for California tend to be overstated, Nevin said, because they are only based on homes sold, and 40 percent of those have involved foreclosures. In the Riverside and Sacramento areas, more than 70 percent of home sales have been in foreclosures.

Foreclosures have been less pronounced in markets close to the Pacific Coast, he said. "We are not anticipating a return to vitality in the rest of 2008 and 2009," he added. But "foreclosures are making their way through the smoke and will decline dramatically by the end of the year. This will bring a new level of stability to the market, and resales will start back up."

Concerned that many more builders will shutter their businesses without help from the state legislature, Becker said that builders in California are seeking some short-term relief:

Builders in California have also joined the national effort to urge Congress to pass a comprehensive housing and economic stimulus bill as soon as possible. In a state with high housing prices that have typically pushed home buyers into jumbo mortgages, of particular interest is increasing loan limits for Fannie Mae, Freddie Mac, and the Federal Housing Administration permanently, he said. Under the Bush Administration's first stimulus bill, higher loan ceilings expire at the end of this year (see Issue 15, Breaking Ground).

Also appearing at PCBC, a panel of economists from the University of Southern California's Lusk Center for Real Estate, while not downplaying the seriousness of the current situation and the need for a legislative response, presented evidence suggesting that the state's housing market is moving toward a position in which it will be poised for recovery.

Survey Shows Homeowners Willing To Invest More In "Green" Home Improvement Products Despite Down Economy

Despite a weakening economy that's forced consumers to cut back on spending, a new survey revealed that homeowners are still willing to pay more for products that are "green" or energy efficient.

In a poll of over 700 homeowners sponsored by Plastpro, Inc., a leading manufacturer of fiberglass home products, an overwhelming majority—or 73 percent—said they would pay more for home-improvement products that they believe are better for the environment. The omnibus survey also showed that women find the green message more compelling than men, with 80 percent indicating they'd be willing to spend more on environmentally friendly products compared to 66 percent of men.

Additionally, 89 percent of those polled said they would be willing to pay more for products that reduce heating and cooling costs, while nine out of ten would buy quality products that last longer—rather than less-expensive materials that save upfront costs but have a shorter life span—when considering replacement items like windows or doors.

"Builders, remodelers, and contractors who are trying to cut costs by offering products that are only average in quality are choosing the wrong path," said Franco An, President of Plastpro, Inc. "Indeed, the survey shows that quality is still the defining characteristic for home-improvement products, despite a decrease in real estate values and a softening economy. Homeowners realize that long-term savings far outweigh upfront costs."

The poll, which was administered by the Opinion Research Corporation, also showed that when planning a home-improvement project involving professional help, 86 percent of homeowners felt it was important that the people they hire be knowledgeable about environmentally beneficial and energy-efficient products.

"It's clear that consumers expect professionals to have a thorough understanding of available materials that are green and energy efficient," commented Mr. An. "Our job as manufacturers is to provide education about these products so contractors and remodelers can in turn communicate effectively to the consumers who want access to them."

According to An, Plastpro continues to develop and manufacture composite home products that are energy efficient and can help offset rising fuel prices. The company uses composite materials to produce products that are stronger and have more durability than traditional wood and steel products.

National Green Residential Mortgage Underwriting Standard Clears The Path For Discounted Financing On "Green-Certified Homes."

Mortgagegreen, Inc. CEO Tomek Rondio has announced that the first National Green Residential Mortgage Underwriting Standard was introduced at the Capital Markets Partnership Organizational Meeting at JPMorgan Chase in New York on June 19, 2008. This new standard is aimed at accelerating the greening of the real estate industry.

The amount of greenhouse gas emissions caused by housing is well defined and the numbers are staggering. Buildings are the largest single category of carbon-emission producers contributing to global warming.

Mortgagegreen is a green real estate finance company that has developed a one-of-a-kind program for rating and funding green-certified real estate. They are the first to introduce Sustainable Mortgage-Backed Securities (SMBS's), bridging the gap between the capital markets and the greening of the real estate industry. During the past seven years Mortgagegreen has completed due diligence, tested and refined this market opportunity, and coauthored the National Green Residential Mortgage Underwriting Standard. Mortgagegreen is positioning itself to move forward with a nationwide expansion as leaders in discounted, green-certified real estate financing.

Mr. Rondio is the Capital Markets Partnership Residential Mortgage Underwriting Standard Committee Vice Chair and coauthor of the National Green Residential Mortgage Underwriting Standard. This Standard will open doors to discounted financing for green-certified buildings, producing significant impact on greenhouse gas emissions and global sustainability.

The Commercial and Residential Standard is being developed through the Capital Markets Partnership's American National Standards Institute accredited consensus process.

For more information, contact Mr. Rondio at 415 461 8080 or visit www.mortgagegreen.com.

HomeSource Offers Wholesale Design Center Shopping Experience

HomeSource Design Center, headquartered in St. Louis, Missouri, is the exclusive interior wholesale provider to the new-home market. The design center entity specializes in bringing commercial wholesale pricing direct to consumers through pre-established relationships with home builders, real estate professionals, and interior designers.

"We currently have two locations—St. Louis, Missouri and Denver, Colorado," said Andy Touchette, President of HomeSource. "Our market research indicates consumers nationwide are interested in the HomeSource business model—the model of the future—including the convenience and variety it provides."

According to Touchette, retail stores cannot offer HomeSource's broad selection of products for all areas of the home, including: furniture, kitchens and baths, flooring, window treatments, electronics, and recreation room products. "Over time," he said, "we've found customers are frustrated with the limited selection and high prices at typical retail stores. That's why we provide a single source for a broad scope of interior needs."

Touchette underscored the fact that customers can choose from an extensive selection of high-quality home interior products from the best known and highest-rated manufacturers.

"In addition, current buying trends revolve around an entirely new generation of buyers with a new way of thinking," says Touchette. "The Internet has had a significant impact on buying trends. As a result, consumers are more savvy. Even though they want to buy locally, they've done their due diligence upfront, online, and know exactly what they want when they walk in our showroom."

Touchette says that the company's direct relationships with manufacturers, as well as their constant focus on keeping overhead low, ensures that customers always get the best price—no sales, no gimmicks, and no need to waste valuable time shopping around for the best value.

The company, established by Touchette in 2004, started with its first design center in St. Louis. HomeSource's newest addition in the Denver area has a similar focus on the unique nuances associated with new homeowners and their demonstrated needs and personal preferences for a one-stop shopping experience.

HomeSource Wholesale Design Center builds its business based on trust. Carrying brands from the world's leading manufacturers at wholesale prices, HomeSource offers high-quality home interior products via a showroom environment that turns customers into long-term clients. The HomeSource motto—from a house to a home—underscores the company's focus on providing guaranteed everyday best pricing with no gimmicks, over 100,000 product choices, and personalized, consultative service by appointment.

For more information on HomeSource Wholesale Design Center, visit www.HomeSourceDesignCenter.com or phone one of two locations: St. Louis 636 532 0055 or Denver 303 799 9700.

EPA's WaterSense® Program Releases Draft Specification For New Homes

Did you know that residential water use accounts for more than half of publicly supplied water in the United States? Yet more and more new homes are built that use water less and less efficiently. With more than two-thirds of the United States anticipating water shortages in the next five years, even under non-drought conditions, the time has come to build more water-efficient homes.

That's why EPA's WaterSense® program just released a draft specification for water-efficient single-family new homes that will help home buyers save water inside and out. Building on the success of the WaterSense-labeled products, such as toilets and faucets, the draft specification provides the criteria new homes will need to meet to be certified and labeled under the WaterSense program in the future. The specification for New Homes is designed to ensure not only sustainable, efficient water use but also a high level of user performance satisfaction.

Once the draft specification is final and builders start participating, WaterSense-labeled new homes could reduce homeowners' water use by as much as 20 percent. In addition to WaterSense-labeled toilets and faucets, these new homes may include dishwashers and clothes washers with the ENERGY STAR® label and will incorporate a water-distribution system that reduces the amount of time it takes for hot water to reach its destination—waiting for the water to warm up is one of the primary reasons that residential consumers waste thousands of gallons of water per year. Pressure regulator valves, water-saving landscaping, and efficient irrigation systems are among other WaterSense-labeled new homes criteria that could allow homeowners to save up to 10,000 gallons of water per year.

In addition to water savings, WaterSense-labeled new homes will increase energy efficiency and cost savings. By using more efficient products, these homes will demand less energy to pump, heat, and treat water, which translates directly into cost savings. If the 1.4 million new homes built each year in the United States followed WaterSense specifications, they could save more than 15 billion gallons of water and approximately $21 billion in energy costs annually.

The draft specification for new homes is currently undergoing public review and is expected to be finalized in the coming year, while the EPA is also developing a network of inspectors to support the program. Once this happens, home builders and developers will be invited to partner with WaterSense and build homes that can be certified to receive the WaterSense label.

Launched in 2006, WaterSense offers a simple way for consumers to identify water-efficient products that perform as well as or better than conventional models. Already, more than 160 toilets and 60 faucets or faucet accessories have been independently tested and certified to meet EPA criteria and earned the WaterSense label. For more information or to get answers to questions about the WaterSense new homes labeling specification, visit www.epa.gov/watersense/newhomes or phone the WaterSense helpline at 860 987 7367.

Digital Home-Rating Program

The green movement has ushered in a push for home building standards. The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) Green Building Rating System was the first national rating program. The National Association of Home Builders (NAHB) also offers a set of guidelines and is working its way through a set of ANSI standards. There are the ENERGY STAR and WaterSense rating programs. And now there is a new program in development to rate a new home's "connectedness" or "technological smarts" to signify that a new home is wired, future-proofed.

The Consumer Electronics Association (CEA) is developing a TechHome Rating System, which lacks awareness among builders. According to CEA's latest State of the Builder Study, 65 percent of builders surveyed were unaware of the system.

The TechHome Rating System was presented to builders at the NAHB's Home Technology Alliance Spring Board Meeting in Washington, D.C. in May. The system, which was created for builders by the CEA's TechHome division comprising of custom installers and manufacturers, is straightforward. Builders check off whether the home they just built includes everything from cable jacks and multiroom audio/video, to lighting control and security. Structured wiring is considered a "bonus" category, but an energy-management system is not. In all there are 16 tech criteria, worth a point each, plus 4 points for the structured wiring. Thus, the total points attainable are 20. To determine the home's score, the total points are divided by two to determine the 1 to 10 rating.

At the presentation some builders questioned the numbered rating system and how the scores would be translated for consumers. The rating explanations will have to be fully explained, especially to homeowners who are not tech savvy about consumer electronics connectivity and operational nuances.

The TechHome rating system is now up for review, and the CEA has agreed to take the Home Technology Alliance's feedback into consideration before presenting the standard for adoption.

Future Home Technologies

A look at home technology that will be standard five to ten years down the road offers a reason for excitement for home builders and prospective buyers. As home builders and developers prepare for an upswing in the market, many are investing heavily in innovation that will drive consumer interest and purchases. At this year's Pacific Coast Builder Conference (PCBC), the largest homebuilding show on the West Coast (June 24 to 27, Moscone Center, San Francisco), many undiscovered trends were showcased in exhibits and presentations. A few of the highlights included:

Customized "Home Theatre"

According to the Consumer Electronics Association, 73 percent of home builders offered a "home theatre" in new homes built during 2007. It's not just about the gadgets or the electronics anymore, but homes of the future will incorporate customized designs and layouts in great rooms, kitchens, and master baths and bedrooms to accommodate the type and dimensions of a widescreen television. Builders and homeowners will begin to factor in angles and distances, as well as how to control lighting for optimal viewing (and listening). At PCBC, these technologies were featured in the TechConnect area at the booths of Audio Visions Inc. (www.avisions.com), Volutone Distributing (www.volutone.com), and others.

Entertainment At Your Fingertips

On-Q Entertainment Home Systems (www.onqlegrand.com) invisibly sends music to every room, allowing a homeowner to play through in-wall and in-ceiling loudspeakers anywhere in the house, and put TV connections right where you need them. The system provides entertainment options for every member of the household, with the flexibility to control everything remotely.

Remote Controls

Remote controls won't just be for TVs and DVDs, but homes will feature a centralized "nerve center" to control water and energy consumption with the idea of making homes more energy efficient. For example, the new GE SmartCommand EnviroDashboard™ (www.geconsumerproducts.com) is an interactive wall panel that provides current and historical feedback on electricity use and water consumption, as well as serving as the home's programmable thermostat and security system interface.

EnerWorks' Space-Saver Residential Solar Water Heating Appliance (www.enerworks.com) uses a programmable digital controller to display temperatures, amount of energy produced, emission reduction, economic savings, and numerous other features. These can also be displayed remotely throughout the home with EnerWorks' portable Thermal Energy Monitor.

Energy-Efficient Lighting

LED lighting promises to be the "lightbulb of the future," replacing incandescents and even compact fluorescents. It uses up to 85 percent less energy than incandescents and less than half that of a comparable fluorescent. Unlike incandescent fixtures, the light is cool to the touch and reduces the burden and cost of the air-conditioning system. LED lighting is expected to last more than 20 years under normal use and will help builders meet certain state requirements, such as California's Title 24 law, that limits energy usage in new homes. At PCBC, enlux Lighting (www.enluxled.com) and Cree Inc. (www.cree.com) were two companies that are producing this new high-tech lighting.

Another solution is the creation of a solid infrastructure wiring system that enables automated lighting control, which can immediately reduce a homeowner's electrical bill by 10 percent or more. In the TechConnect area at PCBC, companies like Suttle (www.suttleonline.com) and Lagotek Corp. (www.lagotek.com) offered builders information on the wiring schemes and costs necessary to offer lighting control to customers.

Loophole Closed On LEED Wood Standards

Although recognizing the positives in the more established LEED program in promoting energy conservation and rewarding the use of building materials grown in a sustainable environmentally sound manner, the United Brotherhood of Carpenters & Joiners of America (UBC) favors an alternative to the LEED standard: The Green Building Initiative's Green Globes System (www.greenglobes.com).

"LEED unfortunately discriminates against Pacific Northwest wood products because it uses a forest certification system that predominates in Europe and South America—not in the U.S.," says Bill Kluting, who represents thousands of mill workers in Oregon through the Carpenters Industrial Council, a division of the United Brotherhood of Carpenters.

"A builder using Douglas fir that is grown under sustainable, environmentally sound practices receives no points under LEED. In contrast, the builder would receive 'LEED points' for using bamboo imported from Asia. Longer growing cycles should not be penalized as long as sustainability and environmental standards are being met."

The UBC, along with the Machinists and Mine Workers, support the inclusion of Green Globes because it does not discriminate against wood and is cheaper and easier to use. Green Globes also gives greater weight to the "full life cycle" of building materials.

"For example, a steel beam, with ore mining, smelting, forming, life in the building, and then disposal when the building is torn down, consumes much more energy than the full life cycle of a Douglas fir 2 x 4," Kluting says. "Wood products take less energy to manufacture. They are less polluting, and they actually absorb CO2 greenhouse gases while they are growing and then replanted."

Choosing Green: The Homebuyer's Guide To Good Green Homes

Energy efficient, non-toxic, healthy homes are the hottest trend in the building industry. Homebuilders are constructing "green" homes in astonishing numbers—more than 350,000 in the U.S. alone in 2006 and 2007.

How does a homebuyer who wants a "green"home know what to look for, what questions to ask a builder, which green home rating systems to trust, and what homes are on the market?

Choosing Green author and nationally recognized "green building" expert Jerry Yudelson has published a valuable "Homebuyer's Giuide To Choosing Green Homes." While targeted at homebuyers the book is important reading for architects and designers, and anyone designing "green" homes and emplloying "green" construction practices. You will learn what is important and the right question to ask when shopping for a "green" home. Among the subjects covered are: energy efficiency measures, solar power systems, water conservation fixtures, healthy indoor air quality, and green products. The research is drawn from the expertise of dozens of homebuilders, homeowners, government officals, and "green" home experts.

The book further profiles more than 50 new "green" hoe developments and condominiu projects thoughout the U.S. and Canada, and supplies a glossary of "green" building terms, an extensive resource section and lists of homebuilders, "green" rating programs, and financial incentives.

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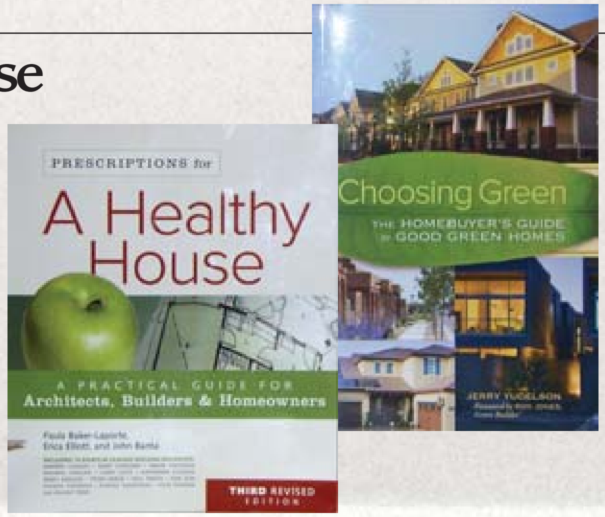
Prescriptions For A Healthy House



The third revised edition of *Prescriptons For A Healthy House* has been published. The book, authored by Paula Baker-Laporte, Erica Elliott and John Banta, is billed as A Practical Guide For Architects, Builders & Homeowners.

Although there is nothing complicated about constructing healthier homes, building for health is still not standard practice, and in fact there are many aspects of conventional hme construction that are detrimental to human wellbeing.

From foundation to rooftop, to home care and repair, the book takes the mystery out of healthy-house building, renovation and maintanance, by walking the owner/architect/builder team through the entire construction process. Among the subjects covered are: frame construction alternatives, thermal and moisture control, finishes, flooring, and furnishings.

The authors—an architect, medical doctor, and restoration consultant—have created a valuable guide to creating healthy indoor and outdoor spaces, supplemented with specialized knowledge from several nationally recognized experts in the field of building biology.

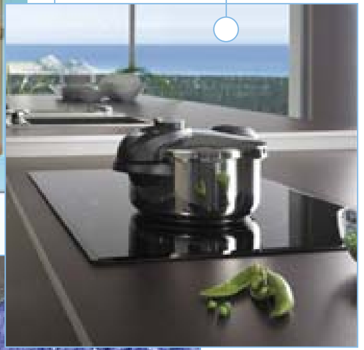
This is a must read for anyone involved in wanting to maximize their home's health environment. The subjects covered relate to the broader aspects of universal design and provide much needed information to those of us who wish to live safer, healthier, and more sustainable lives in our new or existing home environments. *Prescriptions For A Healthy Home* is a trusted guide to creating a healthy, nurturing home. UHD

For more information on this advertiser, circle 04

New to the neighborhood

Tricia Spears

Element Four™ has announced that the WaterMill™ will be available commercially starting in September 2008. Designed to pull water from an unlimited, untapped source—the air—the WaterMill draws moisture from the air outside the home, and through the process of condensation, turns it into pure, fresh drinking water. Under ideal conditions, the WaterMill produces 3.2 gallons of water per day and costs approximately 11 cents per gallon to operate. The unit is 27 inches in diameter and 11 inches deep and is designed to be attached outside the home. The condenser coils are coated in Agion, and each unit contains an internal UV light—both features naturally retard bacterial and other microbial growth without requiring major internal cleaning by the homeowner. To learn more about the $1,299 WaterMill, visit www.elementfour.com or phone 250.717.3733.



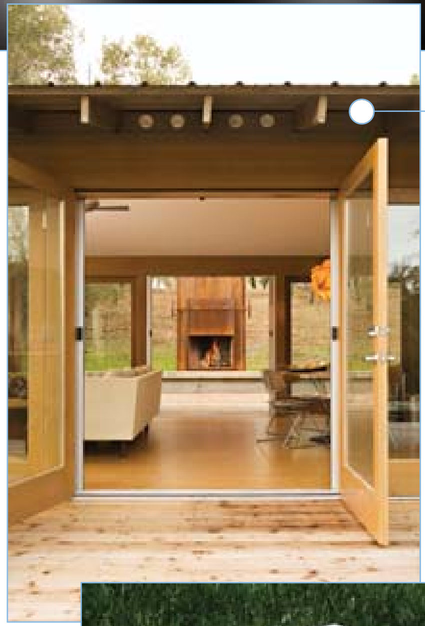
Two eco-friendly and highly efficient products available from **Fagor** are the pressure cooker and the induction cooktop. Pressure cookers cook at higher temperatures, which allow cooking to be completed faster—up to 70 percent quicker than traditional methods—reducing energy costs by about two thirds. Induction cooking costs less to operate than gas and electric coil cooktops, operating on magnetic principles that transfer heat directly to the pan with a surface that is not only flameless but also cool to the touch. Induction cooktops can detect the diameter of the cookware sitting on it and then automatically adjust energy output to the size of the pan. Nearly twice as efficient as gas or other electrical technologies, induction is 90 percent energy efficient, while conventional electric heating is, at best, 50 percent efficient, and gas is even less efficient, at less than 40 percent. Fagor can be reached by phoning 800 207 0806 or by visiting their Web site at www.fagoramerica.com.

Polaris® 100 Gallon Residential Gas Water Heater is the ultimate high-efficiency water heater offering 95+ percent thermal efficiency, an ultra long-life stainless steel tank, and capacity to provide both space heating and hot water for homes. The heater features a submerged stainless steel flue, 100 percent stainless steel tank, non-CFC polyurethane foam to prevent heat loss and reduce energy costs, zero-clearance to combustible building materials, uniform gas/air mixture, solid-state electronic immersion thermostat, on-board diagnostic indicator lights, factory-installed side temperature and pressure relief valve, and brass drain valve. Phone American Water Heaters at 800 999 9515 or visit www.americanwaterheater.com.

The **Applied Coatings Group** has added the Extreme Series to its Modono Collection of glass tiles. The intense color combinations move and change, depending on the intensity and direction of the lighting conditions after installation. Available in a choice of 11 colors—Blue Grotto, Blue Viva, Chestnut Rose, Invitation Pink, Mother of Pearl, Orange Blast, Orchid Green, Oriental Turquoise, River Green, Steel Olive Gold, and Sunrise—and eight different textured patterns, the glass tiles range in 11 different sizes from 2 x 2-inch mosaics to 12 x 12-inch and 12 x 24-inch large-format options. To reach Applied Coatings Group, visit their Web site at www.appliedcoatingsgroup.com or phone them at 585 247 6000.

PRODUCT showcase

Meyda Lighting has unveiled four new fused glass ADA wall scones. Italian for sand, the Sabbia features a design that integrates dark and light amber-colored art glass, with a wave of golden jewels that represent sand crystal. The Pianta wall sconce is designed with a wave of green glass jewels on a band of yellow, with a background of emerald and light green colored art glass. Marea is Italian for wave, and this curved sconce, which is crafted of fused glass by Meyda artisans and designed to meet ADA standards, features a wave of light blue jewels on a background of sapphire, iridescent clear and light blue colored art glass. The Sabbia, Pianta, and Marea sconces are nine inches wide and 11 inches tall. The Italian word for The Dragon is Il Drago, and this wall sconce features a dragonfly design with fused art glass in reds, ambers, clears, blues, greens, and frosted glass. The curved fixture is 11 inches tall and 11 inches wide. To learn more about Meyda's wall sconces, visit them at www.meyda.com or phone them at 800 222 4009.



HOM Escape in Style™ is a comprehensive product line of fully manufactured, high-design modern homes and carefully crafted furniture, accessories, and systems. Conceptualized and designed by a team of designers from the KAA Design Group, the HOM products are designed from sustainable materials and environmentally sound construction techniques and transportation methods. HOM's premier product, a fully manufactured dwelling, is available in three different models ranging in size from 1,000 to 3,600 square feet and featuring from two bedroom and two bath units up to six bedrooms and four baths. Manufactured as a whole and delivered 90 percent complete, the home prices begin at approximately $200 per square foot, including federal permits. HOM incurs a complete environmentally sound construction and transportation process, from sustainable wood resources and efficient fabrication techniques to the use of bio-diesel fuel during delivery. KAA Design Group can be reached at www.kaadesigngroup.com or by phoning 310 821 1400.

Schneider Electric has added the Light-Level Sensor to its Square D® Clipsal® lighting control line. The Sensor measures ambient light levels and automatically issues On, Off, or ramp commands over a C-Bus™ network, allowing for energy savings. The wall-mounted, low-profile units can control relays, dimmers, or remotely operated circuit breakers, changing their status according to preset ambient lighting levels. The Sensors detect daylight levels and automatically adjust the output level of electric lighting to create a balance for increased energy savings. For increased reliability, the Light-Level Sensors store operating status in non-volatile memory for recovery from a power failure, offer a 180-degree field of view, and can be enabled or disabled over the C-Bus network. For more information about Schneider Electric's Light-Level Sensor, phone 888 SQUARED or visit www.squaredlightingcontrol.com.

EcoRock drywall is the first true green replacement for standard drywall. EcoRock is unique in using zero energy and innovative processes in manufacturing, excluding mining and transportation. It is produced using solar and wind power, and is completely recyclable. EcoRock looks, feels, performs and is used the same as standard drywall. It qualifies for LEED® points by replacing standard drywall use with no additional labor cost, training, or quality assurance steps. Standard drywall production results in approximately 25 billion pounds per year of greenhouse gas CO_2—that's over 100,000 BTUs per sheet! Every project built with EcoRock reduces your impact on the planet and on climate change. EcoRock is the "green" replacement for standard drywall and looks, feels, acts and performs the same. For more information, phone Serious Materials at 800 797 8159 or visit www.SeriousMaterials.com.

An Architect

Jim Neal

(Figure 1 background) Family sitting area around the Tennessee field-stone fireplace affords a comfortable place to retire after dinner.
(Figure 2 above) The Outdoor Terrace provides additional seating and expands entertaining options and in wintertime features a view of the downtown Greenville skyline.

(Figure 3 center) An over-scaled eyebrow window brings soft northern light into the upper floor loft and illuminates the Master Bedroom below through an adjacent light shaft.
(Figure 4 top right) The Casual Dining opens through to the Kitchen beyond, providing a more seamless flow of activity during social gatherings.
(Figure 5 bottom) A spring-time view of the Neal Residence from across the lawn.

In the late 1960's, Greenville, South Carolina architect Jim Neal set out to realize a dream common to many young mid-century modernist American architects. Jim was ready to transform his own organic design ideals into a home to share with family. Jim laid out his palate in the well-established tradition of Wright's Usonian ideals. Beginning with a wonderful one-acre suburban lot, dense with vegetation and bisected by a small babbling brook, the long, low, cedar sided house was a perfect fit and served the family well for over four decades - providing an idyllic setting for raising their daughter.

When their daughter completed college the couple realized a growing interest in establishing a new setting to usher in their empty-nest lifestyle. Architectural tastes had changed significantly over the years and the couple began to explore ideas for a different style of house. Other priorities had emerged as well. Accommodating the reality of aging and accessibility would have to be addressed in a new home. A movement toward "green building" was starting to sweep the nation. Jim wanted to take advantage of new technologies that had grown from this movement and take an energy conscious approach to the design of their new home. This involved not only the design phase, but the careful selection of materials as well.

To facilitate accessibility, a floor plan that provided ground level access to living, kitchen, and master bedroom functions would be essential. They also desired a second floor area large enough for comfortable guest bedrooms. It would need to be accessible not only by stairs, but by elevator as well.

The couple selected a site within the heart of Greenville's oldest downtown neighborhoods and began to implement their vision. The project slowly evolved into a 3,800 square foot brick masonry home with a stone chimney on one end and a semi-detached garage on the other. The house is simultaneously contemporary and yet distinctively old-world influenced. The enclosed courtyard evokes a European character, while unique features like the over-scaled eyebrow window and a curved ceiling beneath it evoke the influence of both Sir Edwin Lutyens and Robert Venturi. These seemingly divergent elements come together to create a harmonious whole - tranquil, and quintessentially livable. The home offers

(Figure 6 top) The coffered ceiling in the Great Hall provides order and creates a more intimate scale in this large multi-purpose space.
(Figure 7 bottom) A welcoming arched entryway greets visitors to the Neal residence.
(Figure 8 center) The fireside Sitting Area is designed for comfort and warmth.
(Figure 9 right) This library table offers a reading place in the fully shelved Great Hall.

modern convenience and technology, yet co-exists seamlessly within the context of the 1920's, Craftsman and English Cottage homes of the community.

A licensed architect since 1965, Jim founded Neal Prince Architects in 1969. Today the firm employs a staff of thirty-five. When asked about the formulation of his ideas, Jim cheerfully acknowledges borrowing from many different styles. "I've been able to experiment with other people's homes for such a long time, that I couldn't resist doing the same for myself," he said with a warmhearted laugh.

An ENERGY STAR® Qualified Home

3 McDaniel Oaks Lane, Greenville, SC

The Neal's Energy Star Home Certification

The new home, built for what Jim refers to as, "semi-retirement," reflects the couple's anticipation of living and entertaining on the first level augmented by a second floor to quarter overnight guests. The home exhibits a very open uncluttered design with very few hallways, wide accessible doorways and other barrier free elements that will allow them enjoyment of the home well into the golden years. Always being energy conscious, Jim notes that the second floor has, "separately zoned climate control to reduce the potential for wasted energy."

The main living space follows the English tradition of the great hall, where several functions are combined in a single large space. Here the space is crowned with a thoughtfully articulated coffered ceiling. To one end of this great hall, a family sitting area is anchored by a large Tennessee fieldstone fireplace. At the far end of the room is a casually arranged dining area, beyond which a kitchen is partially hidden behind an open counter. "We've noticed that when people entertain, everyone tends to socialize in the kitchen," Jim commented, "but here the open spatial movement between the kitchen and dining areas extends this social hub into the greater portion of the house."

The great-hall portion of the house is connected to a fieldstone terrace on the view side This terrace is partially covered, to provide relief from the midsummer heat, skylights and French doors daily flood the great hall with natural light. The terrace looks over an extensive lawn dotted with old growth, high canopy trees which provide a picturesque distant view of the downtown Greenville skyline during winter months. Nearby an intimately scaled courtyard connects with the garage, which by virtue of its pass-through design, offers a pleasant outdoor entertainment space.

Jim's perimeter detailing for the main living and dining areas is lined, floor-to-ceiling, built-in book shelves. The master bedroom features matching baths and wardrobes – his with a shower, and hers with a tub. Their separate personalized wardrobe closets feature custom drawers and storage tailored specially for each of them. The deliberate consideration of natural light is also displayed here by a horizontal "light shelf" allowing light to transcend into the bedroom from the large eyebrow dormer common to the stairs.

This kind of thoughtful personalization extends to the pair of (home office chambers) as well, where Jim and Leonette have symmetrically placed matching studies located off the great hall. That offers a view toward the terrace and features a secondary view toward each other.

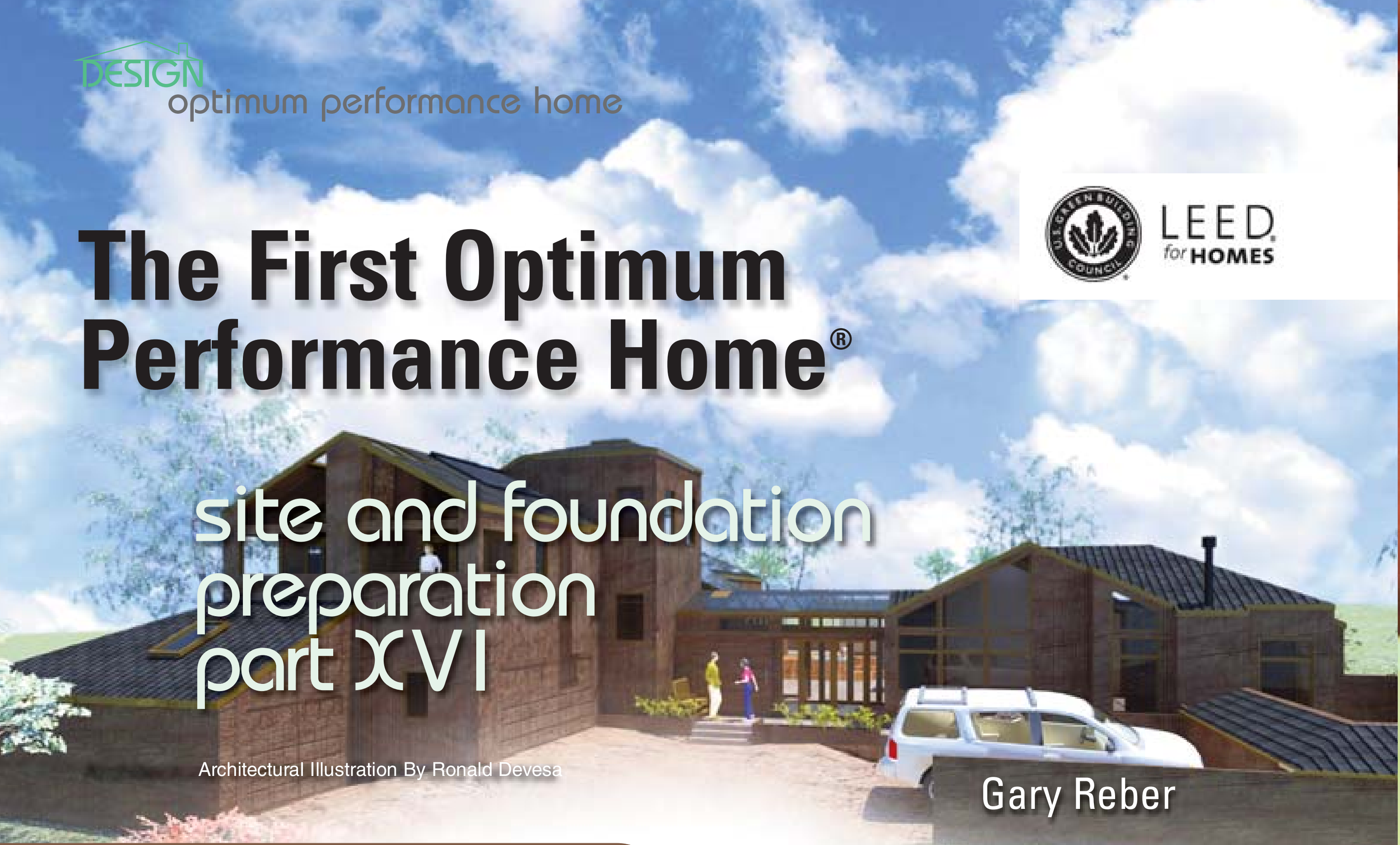
The home's warm and welcoming character masks a wealth of environmentally responsive and energy-efficient features which collectively contributed to the home receiving an Energy Star Qualified Home Award from the U.S. Environmental Protection Agency. This prestigious award is given in recognition of exemplary energy efficiency and use of green building materials in construction.

While the house benefits from many green building and environmentally savvy features, it is perhaps most usefully appointed with a feature that is not visible in the finished construction. The structure particularly benefits from the extensive incorporation of Icynene insulation used in the exterior walls, floors, and roof systems. This unique foam insulation alone provided the majority of the points necessary to qualify for an Energy Star Home designation. In its installation, water is the only transmitting agent for Icynene. It contains no CFC, HCF, HFA, HFC, Capital Formaldehyde or other volatile organic compounds. Icynene seals out dust, pollen and other allergens from the structure; and as an air barrier, Icynene minimizes the potential for condensation and the threat of mold associated with excessive moisture.

Other energy efficient features that Jim selected included Pella windows and doors with low-E type insulated glass (which generated an additional significant energy savings). Jim also utilized high efficiency heat pumps to help reduce his dependency of fossil fuel based systems.

In the end, Jim Neal crafted a home that serves as a very personal statement about his convictions on design, lifestyle, aging and the role of responsible building in an age of environmental awakening. UHD

For more information on this advertiser, circle 06



The First Optimum Performance Home®

site and foundation preparation part XVI

Architectural Illustration By Ronald Devesa

LEED for HOMES

Gary Reber

synopsis

- Extensive and complex underslab infrastructure continues to be the focus of construction on the site prior to the pouring of the suspended concrete slab.
- The project's concrete mixes use Portland Cement, Kryton's KIM admixture, Euclid Eucon A+ admixture, and 40 percent fly ash.
- The first stage Amvic ICF construction is the underground wine cellar and Carlisle BARRICOAT-R waterproof coating.
- Prior to the granular mixture fill, the placement of the DELTA-MS UNDERSLAB membrane, the under-slab R-Control Perform Guard EPS, and the Uponor AQUAPEX-encased suspended slab concrete pour, all the underground infrastructure for the home will have been installed.
- The radiant floor portions of the 5-inch thick suspended concrete slab and under-slab insulation are encased at the perimeters with the EnergyEdge® 8-inch Frame Building Rail.
- Both the hot and cold water corrugated pre-sleeved Uponor AQUAPEX tubing is further insulated with Armacell AP/Armaflex tube insulation.

Introduction

After five years of design and plan development work, the first Optimum Performance Home® is now under construction.

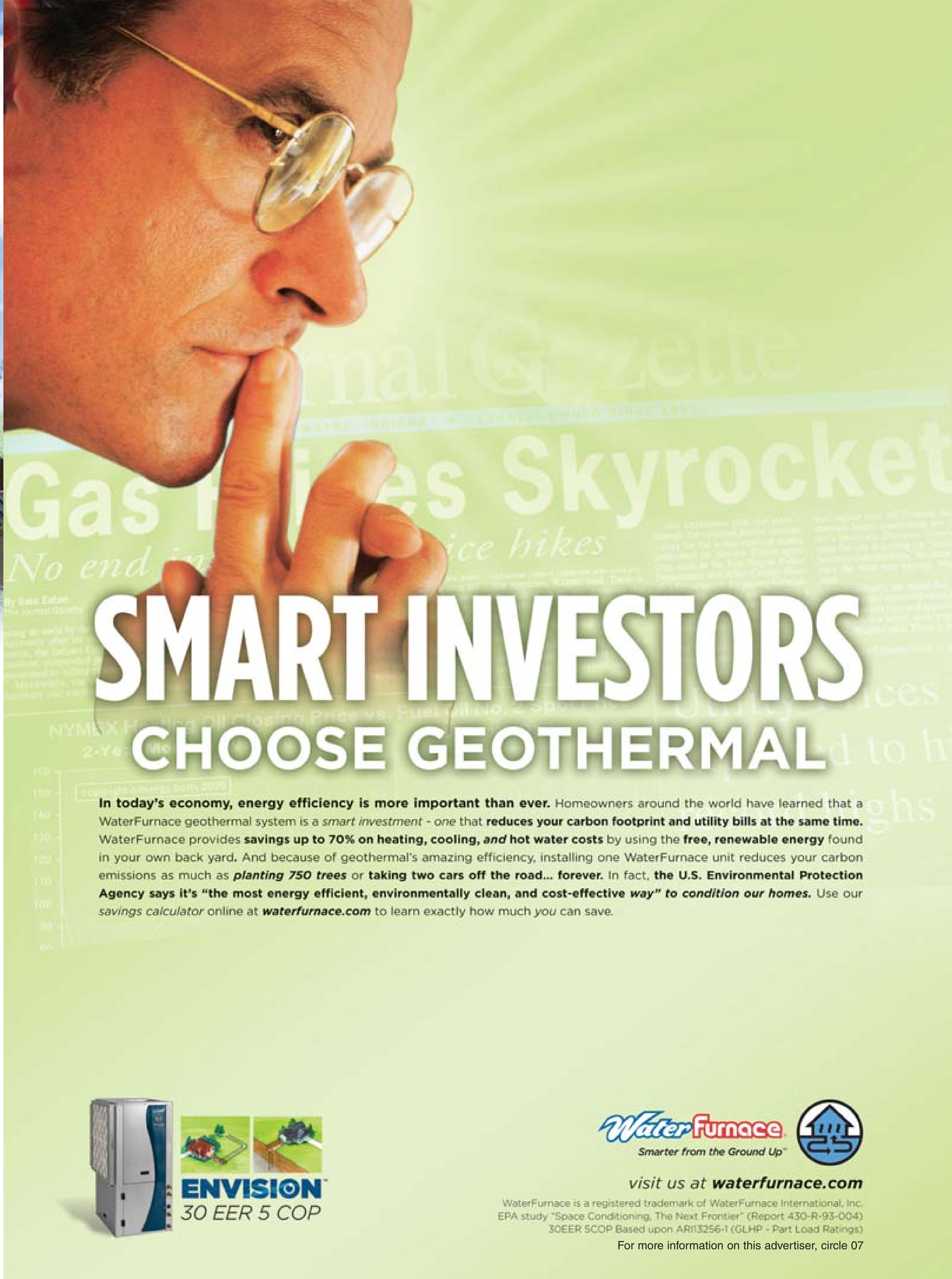
This is the sixteenth article in the series documenting the design and construction of the first Optimum Performance Home. The project has been selected by the U.S. Green Building Council (USGBC) for inclusion in the national Leadership In Energy & Environmental Design (LEED®) for Homes pilot program, the nation's most challenging green build certification initiative, and the goal is Platinum certification.

The home is being built at The Sea Ranch, located in Sonoma County, along the Northern California coastline of the Pacific Ocean, approximately 110 miles north of San Francisco.

To document the day-to-day construction of the home, an iBeam Systems time-lapse construction camera is up and running. Visit http://www.ultimatehomedesign.com and then click on the "Optimum Performance Home Build Cam" button. Photos are captured and automatically uploaded to iBeam's secure server every 15 minutes from 6:00 a.m. to 6:00 p.m. each day. The images can easily be e-mailed or printed to document job site conditions.

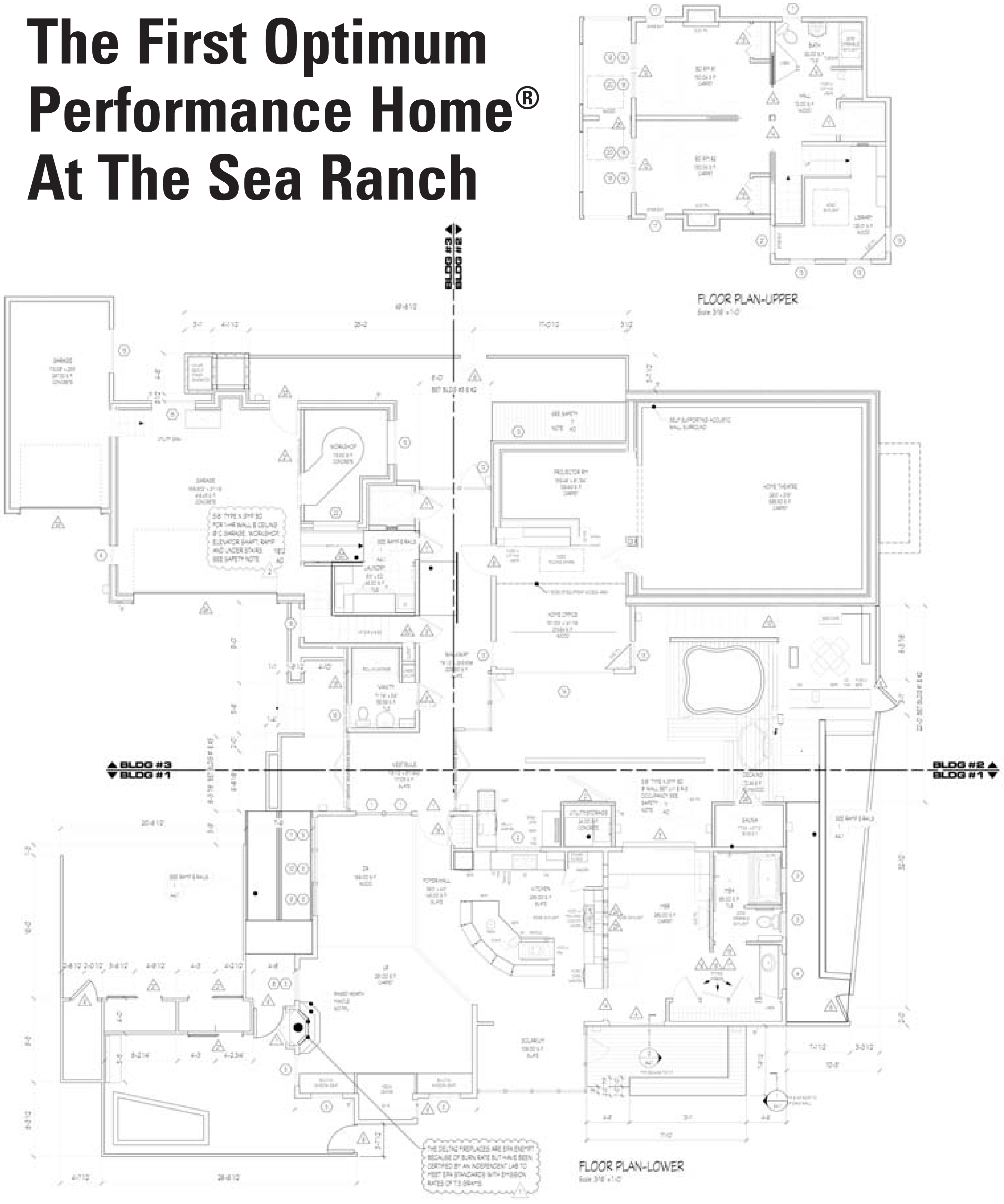
Using iBeam's technology, our team is able to view a high-resolution photo archive of the entire project daily, including stunning 1920 x 1080p (progressive) high-definition time-lapse movies each month (see a standard-resolution version at www.ultimatehomedesign.com/oph-photos.php).

Upon completion, the entire construction photo archive will be featured as a 1080p high-definition time-lapse movie and



For more information on this advertiser, circle 07

The First Optimum Performance Home® At The Sea Ranch



DESIGN
optimum performance home

The Sea Ranch, Sonoma County, California
Photo Courtesy Rozanne Rapozo
(www.natureasiseeit.com)

will become part of a high-definition television program and educational documentary that Steve Michelson Productions and I are producing.

Ultimate Home Design® Concept

The showcase project is exemplary of the "Ultimate Home Design®" concept, which integrates age-friendly universal design with the best sustainable building practices, while exerting minimal impact on the environment. Universal design is the inclusive, non-discriminatory design of products, buildings, environments, and urban infrastructure; as well as information technologies that are accessible to and useable by (almost) all. With respect to home design, the idea is to design and build homes that have no physical barriers, thus sustaining people of all ages and all capabilities in a functional, comfortable, and aesthetic lifestyle.

A building-science systems approach to home building is the cornerstone of the project, with emphasis on the relationship between the home's components and the envelope they create. Also paramount is good stewardship—proper regard and respect for the rights of neighboring homeowners and the surrounding natural setting, and resource efficiency. The goal is to optimize occupant health, comfort, and safety; maximize energy efficiency and structural durability; and minimize environmental impact. In addition, the aim is toward providing a nurturing home environment to support independent living and sustainable lifestyles.

Part I of this case study series appeared in Issue 1, January/February 2006. The introductory article covered the project scope. Thereafter, each issue has contained a part of the continuing series by working through site planning and preparation; Low-Impact Development (LID); further refinements to the site plan and drainage design; The Sea Ranch Design Committee-approved architectural/structural and grading/drainage submittals with conditions that translated to clarifications on certain building components and material finishes; particular aspects of the home's mechanical plan; structural aspects of foundations, structural walls incorporating Insulating Concrete Forms (ICFs), and Structural Insulated Panels (SIPs), as well as roofing; the acoustical design of the dedicated Optimum Performance Home Theatre™ and rear-projection room; interior design approaches and materials; kitchen, bath, and home fixtures; universal design architecture; fire-risk mitigation; energy generation; and courtyard experience. "Breaking Ground" was the title of Part XIII, along with "Courtyard Experience." Part XIV and XV, respectively, covered the initial continuing phases of "Site And Foundation Preparation."

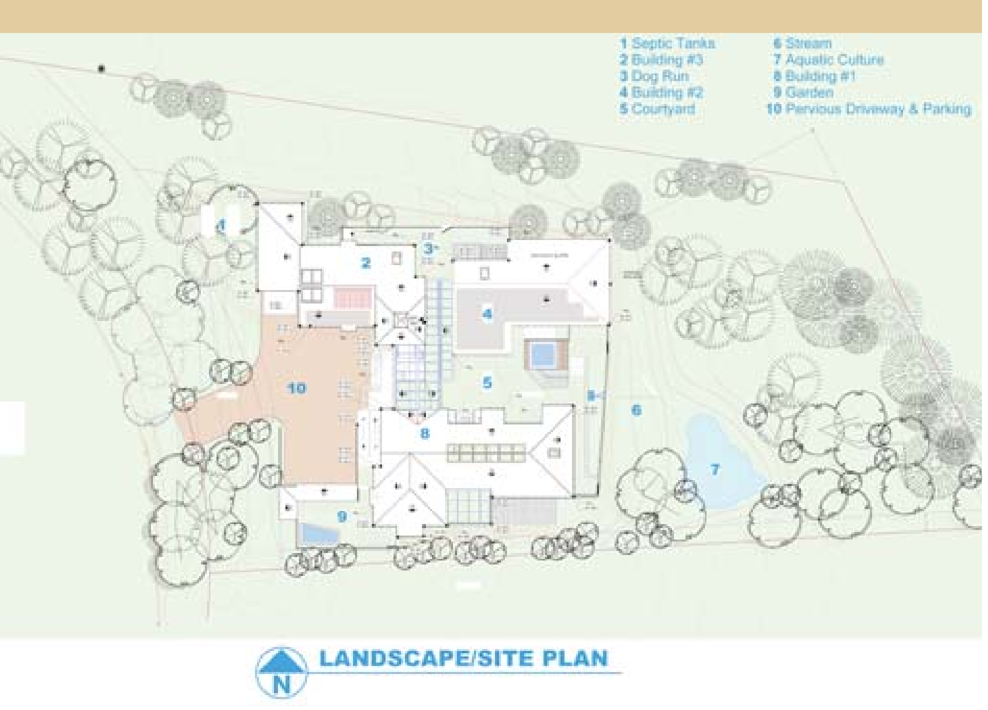
Construction remains at the initial site grading, foundation, and mechanical, plumbing, electrical, and low-voltage infrastructure stages. This complex and leading edge under-slab infrastructure work is documented in the day-to-day time-lapse photography and archived photos on the Ultimate Home Design Web site.

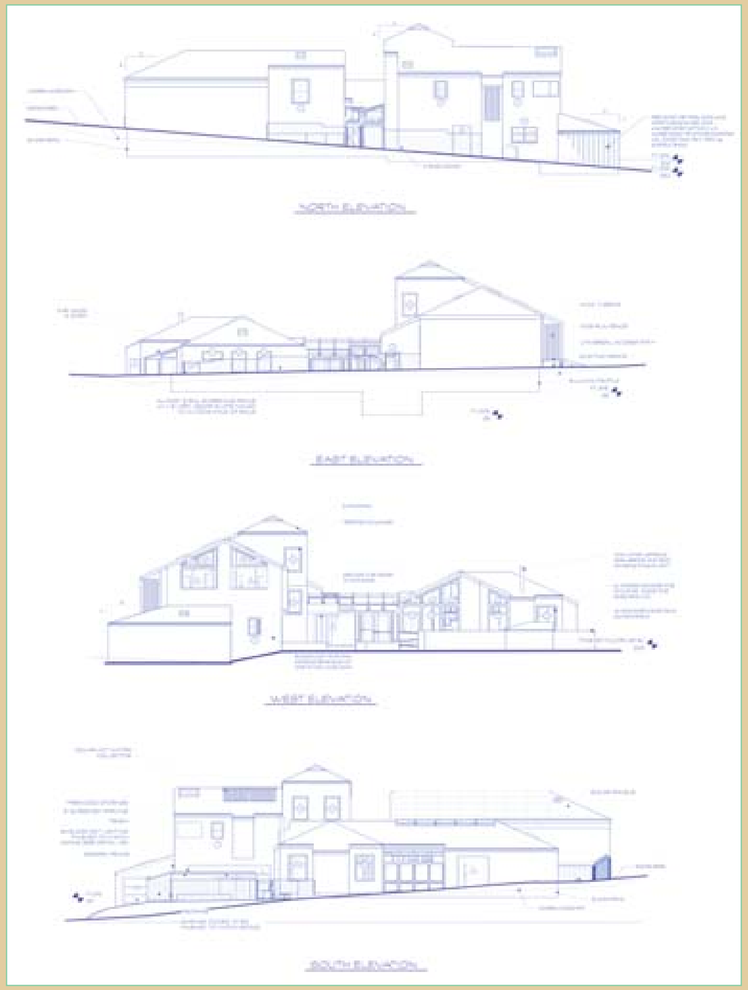
Completion of the home is anticipated for December 2008. It is our intent to produce a high-definition documentary for educational use by the U.S. Green Building Council, the organization who created the LEED for Homes rating and certification program. Our presentation will reveal the step-by-step process for creating the first Optimum Performance Home—expected to be one of the highest rated, if not the highest, LEED for Homes Platinum residential home in the world!

Construction Scheduling

Below is the breakdown of the initial site preparation and grading process and foundation work completed or under way. An outline will be provided in Part XVII for the next stage of construction relating to the completed below slab infrastructure and above the slab Amvic ICF and ThermaSAVE SIP walls and roofing.

> "The showcase project is exemplary of the 'Ultimate Home Design®' concept, which integrates age-friendly universal design with the best sustainable building practices, while exerting minimal impact on the environment."





The elevations of the Optimum Performance Home at The Sea Ranch

Pre-Construction Start Meetings

Site Work
- Clear Lot Vegetation
- Lay Out House Pad
- Install Curtain Drain Around Pad
- Excavate Optimum Performance Home Theatre, Alcove, and Wine Cellar
- Lay Out Footings
- Install Temporary Electrical Power
- Install iBeam Systems Time-Lapse Pro Construction Camera (See Part XIII)
- Install GetWireless and WildBlue Internet Transmission
- Activate Water Service
- Form Underground ICF Home Theatre, Alcove, and Wine Cellar Walls
- Verify Foundations' Site Placement/Inspection
- Rough Excavation Large Pond and Septic Trench to Designated Leech Field
- Install StormTech Infiltration Chambers (See Parts II, III, and IV)

Foundations
- Dig Initial Stage Foundation Footings and Install French Drain
- Pour First Stage Engineered Controlled Density Fill (CDF) Concrete with Portland Cement and Headwaters Resources Fly Ash (See Part VI)
- Set Forms; Tie Rebar Steel, Hold Downs, and Anchor Bolts
- Pour Final Stage Foundation Footing Concrete with Portland Cement, Headwaters Resources Fly Ash, Kryton's KIM Admixture, and Euclid Eucon Admixture (See Part VI)
- Run Spunstrand Acoustically Treated Air-Conditioning Duct for Home Theatre (See Part V)
- Conduit Trenching for Uponor AQUAPEX Plumbing (See Parts V and X)
- Run Armacell Insulated Uponor AQUAPEX Tubing
- Run Plumbing Waste
- Run Wardflex Flexible Corrugated Stainless Steel Fuel Gas Tubing
- Run Underground Waterline from Pond to the Boat Garage for Fire Hose Connection (See Part XI)
- Run Underground Drain from Wine Cellar to StormTech Inflitrator Chambers Located Across the Property Frontage .
- Install Gravel Around Plumbing
- Run Plumbing Conduit and Supply
- Run Electrical and Low-Voltage Conduit
- Lay Out NuTone Central Vacuum System (See Parts IX and X)
- Finalize Underslab Infrastructure and Zurn Flo-Thru Trench Drain
- Install EnergyEdge Insulated Form Around Perimeter of Slab
- Underslab Inspection
- Place Gravel and Sand Underslab
- Install Cosella-Dörken DELTA-MS UNDERSLAB
- Install AMF Corporation R-Control Perform Guard EPS Underslab Insulation
- Install AMF Corporation R-Control Perform Guard EPS Around Perimeter of Slab Under EnergyEdge
- Prepare for In-Floor D-Box™ Technologies Custom Motion Platform In Home Theatre (See Part VII)
- Install Slab Rebar
- Install Uponor AQUAPEX Radiant Floor Tubing
- Pour Concrete Slab
- Treat Concrete Slab with Nisus Corporation Bora-Care Termite Barrier Pretreatment
- Backfill Foundation

Wine Cellar
- Construct Underground Wine Cellar with Amvic ICFs
- Pour Concrete Into Amvic ICFs
- Construct Concrete Roof to Support Earth Garden
- Waterproof Wine Cellar Walls with Carlisle Coatings

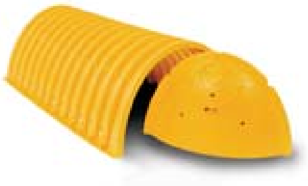
Garages
- Construct West Amvic ICF Garage Wall
- Pour Concrete into Amvic ICFs

Septic System
- Dig Septic Trench, Cut Road, Install Pipes, Backfill Trench, and Repair Road

The final site preparation work is being done by Steve Glaze and Robert Swiggle, both with extensive experience in excavation for residential projects on The Sea Ranch. They are very supportive of the project and sensitive to the environmental concerns and protections that are in place for the project. Prior to the start of the site's excavation work, the tall grasses were cut down by Steve. This top layer of roots is being stockpiled along with the extensive mud excavated and allowed to form a "top soil" compost for later spreading back over the site, just prior to landscaping with indigenous vegetation and trees. John Feeney, our on-site supervising contractor and lead carpenter, and his carpenter team consisting of Ian Currie, Gerard Feeney, Jerry Feeney, and Aaron Phillips are performing the foundation work as well as installing the StormTech® Infiltrator Chambers along the property's frontage. The StormTech SC-310™ chambers are low-profile modular underground stormwater detention structures, approximately 7 feet in length. StormTech chambers are molded from Polypropylene resin, which is inherently resistant to environmental stress cracking and chemicals typically found in stormwater runoff. They are an integral part of the site's stormwater management system and designed to balance the perched shallow groundwater, seepage, and sheet flow that move across the property from the neighboring south and east properties. The purpose of the infiltration chambers is to work in concert with the French drain that intercepts groundwater behind the house and return it to the groundwater in front of the house. The infiltration chambers have been carefully installed and set back toward the house from major tree roots and the existing screen of trees and plants that exists at the site. The trench bottom was shot dead level (with a transit), so that any excess water that is introduced to the infiltration strip will redistribute evenly across the site, and infiltrate back to groundwater, which is perched across the site at approximately 5 feet below grade at the boundary of the overburden and bedding formations. The trench bottom for this infiltration is approximately 2.5 to 3.5 feet below grade.

Energy Edge and Amvic ICF

StormTech® Infiltrator Chambers



- The StormTech SC-310™ chambers are low-profile modular underground stormwater detention structures, approximately 7 feet in length. StormTech chambers are molded from Polypropylene resin, which is inherently resistant to environmental stress cracking and chemicals typically found in stormwater runoff.

Sebastopol, California-based Weeks Drilling & Pump Company, under the direction of Chris Thompson, CEO, will drill the five 310-feet-deep geothermal bore holes after the foundation work is completed.

Don Bartlett of Bartlett Mechanical Services will install the WaterFurnace® geothermal and complete the interface with the WaterFurnace system with the Spunstrand underground acoustically damped air-conditioning duct system. Don is also installing the Uponor AQUAPREX radiant floor tubing. The Spunstrand system was constructed and installed by Jerry Feeney and John Feeney.

Bill Wilson Environmental Planning and Design, LLC with Dylan Coleman, principal in Mt. Shasta, California-based Wonderwater, are responsible for the on-site water-management systems, including the pond and drains. Aqua Harvest International's Terry McMains, based in Rio Rancho, New Mexico, designed the site application of the EcoRain™ Stormwater Tank Modules underground water cistern manufactured by Stormwater Solutions, LLC. The cistern will retain roof runoff from Gutter Helmet® guttered interior roof areas. On other eaves, Rainhandler® grids are planned to shatter and resuspend roof runoff, spraying it to the adjacent mulched landscape areas to facilitate infiltration. Thus, all impervious roof surface areas that produce runoff are mitigated.

The large pond at the eastern rear of the site is intended to both celebrate and accommodate the excess presence of moisture moving across the site. The pond is designed to act as a hydraulic stabilization feature by storing and managing excess moisture crossing the site, including some of the perched groundwater, and to create habitat value for native and migratory wildlife.

A "beach" with subsurface horizontal geotechnical drains (provided by Smart Drain™) will be installed at the "upper," or southeast, corner of the pond, overlain by coarse sand and rock chips, to intercept seepage and runoff from the neighboring property and recharge the pond.

The excavated pond is constructed as a dip in the topography, without any constructed berm or engineered containment. It will be sealed with a veg-etable)oil polymer (provided by Seepage Control) that is completely non-toxic and used for this purpose, and the pond will not leak.

Gutter Helmet®

• The Gutter Helmet® gutter protection system is a multi-patented, flow-limiting, ribbed design that slows and spreads water, causing it to flow easily into the gutters, while debris falls to the ground.

Rainhandler® Gutters

• Rainhandler® gutters are a state-of-the-art all-aluminum, never-rusting, maintenance-free rain dispersal system that converts roof runoff to a 2- to 3-foot wide band of soft rain-sized droplets sprinkling the landscape.

iBeam Time-Lapse Pro Construction Camera Perspective

GetWireless And WildBlue™ Satellite Speed Internet®

In order to facilitate capturing the high-resolution images taken on-site by the iBeam Time-Lapse Pro Construction camera, an "always on" GetWireless AirLink Raven X EVDO V4221-VA and AirLink Dual-Band EVDO Antenna is being employed. This system provides the Ethernet Internet interface for the Verizon Wireless Broadband uplink service for the iBeam Systems time-lapse camera.

A WildBlue™ Satellite Speed Internet® system developed by WildBlue Communications, Inc. and offered as part of EcoStar's DISH Network satellite services is being used on the site for Internet connectivity. The offer is provided separately under the EchoStar brand name, and sub-branded as "powered by WildBlue." The new WildBlue Enterprise Solutions™ satellite services system offers business-class broadband connectivity via state-of-the-art satellite technology, using a 26-inch satellite mini-dish equipped with both a transmitter and receiver for two-way satellite connectivity to the Internet. See Part XIII for a full description of the service.

This Issue

In this issue, the focus continues to be on the various construction elements related to site and foundation preparation.

The site's soil conditions (see Part XIV) resulted in extensive additional excavation work, including digging trenches around and within the perimeter of each building in the three-building compound. Deep trenches were necessary to reach the deeper-laying bedrock. A specially engineered Controlled Density Fill (CDF) concrete mix was designed to fill the voids and provide a strong, stabilized surface upon which to support the foundation footings. CDF, also known as "flowable flow," is an engineered, controlled, concrete-fill material, which is self-placing, self-leveling, self-compacting, and non-settling. Our particular formula required a concrete mix consisting of equal amounts of Portland Cement and fly ash, water, and 3/8-inch aggregate and concrete sand. The so-called "two-sack mix" consisted of 188 pounds of Portland Cement per cubic yard in the final concrete mix and an equal fly ash pound-weight. One sack of Portland Cement weighs 94 pounds. The mix design was formulated by Doug Yeggy at Headwaters Resources. Headwaters Resources is the source of the fly ash that will be used in the concrete mixes designed for the project. The Portland Cement Association and the California Portland Cement Company are the sources of the cement used in the project. Delivery of the Portland Cement and fly ash to the concrete production facility was handled by Conti Materials. The local concrete production facility is Bed Rock Products, based in Point Arena (and Gualala), California. Bob Hay's Bed Rock Concrete Pumping is providing the concrete-pumping service for the project.

Doug has designed two other concrete mixes for the project: standard foundation footing and the concrete to be poured into the Amvic ICFs, and the suspended slab-on-grade. These mixes use Portland Cement, Kryton's KIM admixture, Euclid Eucon A+ admixture, and 40 percent fly ash. The mix design for the standard foundation footings used 324 pounds of Portland Cement, 216 pounds of fly ash (40 percent), 11 pounds of KIM admixture, and 16 ounces of Eucon A+ admixture per cubic yard. The suspended slab-on-grade mix design will use, per cubic yard, 360 pounds of Portland Cement and 240 pounds of fly ash (40 percent), 11 pounds of KIM admixture, 18 ounces of Eucon A+ admixture, and

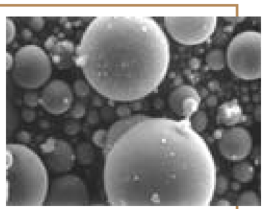
Smart Drain™

• The Smart Drain™ belting uses micro channels to move water by capillary and siphoning actions. Unlike ordinary perforated pipe, it doesn't clog. Moreover the excess water is filtered, which reduces soil runoff. Nothing but clean water is drained.

Seepage Control®

• Seepage Control® manufacturers the exclusive ESS-13 Environmental Soil Sealant formula, a non-toxic liquid vegetable oil polymer emulsion that is either poured into the water, or mixed with the soil and compacted to provide a leakproof pond bottom.

Headwaters Resources

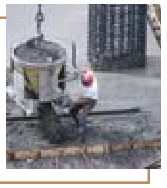


• Fly ash improves the performance of concrete foundations, making them stronger, more durable, and more resistant to chemical attack, while creating significant environmental benefits through stewardship of an abundant industrial resource. Because the tiny fly ash particles fill microscopic spaces in the concrete, and because less water is required, concrete using fly ash is denser and more durable. And concrete containing fly ash becomes even stronger over time compared to concrete made only with cement.

Kryton's KIM® Admixture System

• KIM® admixture renders hardened concrete impermeable to water penetration, reduces drying shrinkage, protects steel reinforcements from corrosion, and improves concrete durability. The advanced integral crystalline chemicals react with water and unhydrated cement particles to form millions of needle-like crystals to permanently block the pathways for water and waterborne contaminants.

Euclid Eucon A+



• Euclid Chemical Company's Eucon A+ Type A admixture serves as a fast-setting, water-reducing, and plasticizing admixture for concrete that does not adversely affect concrete set times.

Clockwise: Uponor Plumbing, Electrical Conduit, Amvic ICF Underground Wine Cellar, Energy Edge

FORTA® FERRO®. The Amvic ICF concrete mix design will use the mix design that was used for the standard foundation footings.

For an in-depth presentation the application of these mixes to the project see Issue XV.

KIM admixture renders hardened concrete impermeable to water penetration, reduces drying shrinkage, protects steel rebar reinforcements from corrosion, and improves concrete durability. The advanced integral crystalline chemicals in the KIM admixture react with water and unhydrated Portland Cement particles to form millions of needle-like crystals to permanently block the pathways for water and waterborne contaminants.

Euclid Chemical Company's Eucon A+ Type A admixture serves as a fast-setting, water-reducing, and plasticizing admixture for concrete that does not adversely affect concrete set times.

The suspended slab-on-grade mix design incorporates FORTA FERRO, an easy-to-finish, color-blended fiber, made of 100 percent virgin copolymer/propylene consisting of a twisted bundle non-fibrillating monofilament and a fibrillating network fiber, yielding a high-performance concrete reinforcement system. This fiber provides long-term concrete durability and increased impact resistance. FORTA FERRO is used to reduce plastic and hardened concrete shrinkage prior to the initial set, reduce hardened concrete shrinkage cracking, improve impact strength, and enhance concrete toughness and durability. This extra heavy-duty fiber offers maximum long-term durability, structural enhancements, and effective secondary/temperature crack control by incorporating a truly unique synergistic fiber system of long-length design. FORTA FERRO is non-corrosive, non-magnetic, and 100 percent alkali proof. The recommended dosage rate of FORTA FERRO is 3 to 30 pounds per cubic yard of concrete

DESIGN
optimum performance home

added directly to the concrete-mixing system during, or after, the batching of the other ingredients and mixed at the time and speed recommended by the mixer manufacturer (usually four to five minutes).

The Amvic ICF structural elements of the underground wine cellar have been constructed. The next step is to seal and waterproof the underground-cellar. Carlisle® Coatings & Waterproofing BARRICOAT-R is a waterproofing and vapor barrier membrane designed for vertical surfaces, above or below ground. This roller-applied, water-based, asphalt emulsion is modified with a blend of synthetic rubbers and special additives which cures to form a flexible, monolithic, waterproofing membrane. The membrane prevents lateral water migration. BARRICOAT-R is ideally suited for waterproofing on below-grade foundation walls, and other areas where a seamless elastomeric waterproofing is required.

Drainage plays a critical role in the design and construction of below-grade applications. Without proper drainage, groundwater seepage may cause hydrostatic pressure and leakage, resulting in structural damage. Good drainage is particulary critical to the success of this project due to the adverse damp conditions contributed by underground springs.

Carlisle's MiraDRAIN's multi-directional flow design allows a continuous path for water discharge, eliminating the potential for hydrostatic pressure build up. It allows water to pass freely into the drainage core, where it is gravity fed into the site's drainage collection system.

The exterior earth-encased BARRICOAT-R membrane-protected Amvic ICF wine cellar walls will be covered with MiraDRAIN 6200, high-performance, high-strength drainage composite consisting of a three-dimensional, high-impact polystyrene core, and a

FORTA® FERRO®

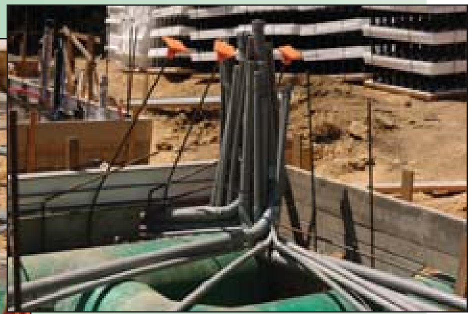
• FORTA® FERRO® is a copolymer/propylene fiber that is used to reduce plastic and hardened concrete shrinkage prior to the initial set, reduce hardened concrete shrinkage cracking, improve impact strength, and enhance concrete toughness and durability.

Carlisle® Coatings & Waterproofing

• BARRICOAT-R is a waterproofing and vapor barrier membrane designed for vertical surfaces, above or below ground. MiraDRAIN 6200 is a high-performance, high-strength drainage composite consisting of a three-dimensional, high-impact polystyrene core, and a nonwoven filter fabric.

R-Control® Perform Guard EPS

• Rigid Type IX R-4 (per inch) 2-inch R-Control® Perform Guard EPS (expanded polystyrene) insulation from AFM Corporation provides superior thermal mass for uniform heat transfer of slab-encased radiant floor systems. Photos courtesy of AFM Corp.



Clockwise: Electrical Conduit Home Theatre, Electrical Conduit Central Control, Amvic ICF Underground Wine Cellar, EnergyEdge/Uponor

Left: Boat Garage Forms, Underslab Infrastructure, Amvic ICF Wine Cellar, Right: Stormtech Infiltration Chamber

nonwoven filter fabric. MiraDRAIN 6200 has the added benefit of a polymeric sheet adhered to the back of the core, to prevent the drainage core from die cutting the waterproofing membrane. The filter fabric is bonded to the dimpled polystyrene core to minimize fabric intrusion. The fabric also prevents the passage of soil particles into the core, while allowing water to pass freely.

The exterior concrete roof of the wine cellar will be protected with a BARRICOAT-R membrane and MiraDRAIN GR9200 will be applied over the waterproof membrane. This sheeted membrane is designed specifically for green roofs, garden roofs, and large planter applications. Used with the BARRICOAT-R waterproofing, this drainage composite provides adequate water retention for sedums, grasses, and plant life, while providing a channel for excess water to drain.

The first-stage concrete pour provided the necessary compaction strength to support the final-stage concrete footing pour, upon which will be suspended the concrete slab. The slab will be 5 inches thick. Under the slab, covering a granular mixture compacted over the soil, will be a Cosella-Dörken DELTA®-MS UNDERSLAB waterproofing and vapor-retarder membrane designed for slabs on or below grade and a rigid Type IX R-4 (per inch) 2-inch R-Control® Perform Guard EPS (expanded polystyrene) insulation from AFM Corporation. R-Control is a proven material with built-in protection against the destructive force of termites. This phase of the construction will be covered in a future article.

DELTA-MS UNDERSLAB is a tough, impermeable vapor-retarding membrane that is placed on the earth or granular surface prior to placing the concrete. DELTA-MS UNDERSLAB prevents the early loss of hydrated water, thus producing a concrete that meets design strength and provides more even curing characteristics in concrete. The membrane offers a full-capillary break and vapor retarder that prevents the upward migration of moisture through the capillaries that exist in all concrete. Additionally DELTA-MS UNDERSLAB can act as a barrier to soil gases. This will provide a healthy and dry environment.

A 2-inch thick R-Control Perform Guard EPS will be placed over the DELTA-MS UNDERSLAB to provide superior thermal mass for uniform heat transfer of the WaterFurnace geothermal/heat pump heated water through the Uponor® 1/2-inch AQUAPEX® in-floor tubing encased in the 5-inch-thick suspended concrete slab.

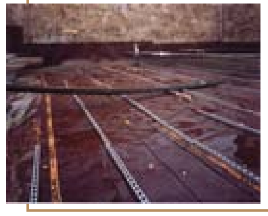
Prior to pouring the slab concrete, suspended over the final stage concrete footings, the Zurn® Flo-Thru trench drain that runs the full length of the courtyard will be installed. The modular Zurn molded-slope drain is designed for load-bearing strength, hydraulics, chemical resistance, and structural integrity.

A significant element in the proper functioning of the dedicated Optimum Performance Home Theatre is the acoustically treated Spunstrand underground air-conditioning duct system that will deliver low-velocity, ultra-quiet air-flow circulation in the acoustically treated theatre. The system is specially fabricated with duckboard and 1-1/2-inch-thick duct liner inserted into the energy-saving R-10 insulated Spunstrand ducts to hush background noise due to ventilation hum, self-generated air noise, and on/off ventilator switching.

Spunstrand manufactures green duct in the Pacific Northwest. The duct maximizes clean air flow, eliminates rust and mold growth, and provides a

Clockwise: Uponor-Armacell Armaflex Insulation, Amvic ICF Garage Wall, Wine Cellar Roof Form

Cosella-Dörken DELTA-MS UNDERSLAB



• DELTA-MS UNDERSLAB is a tough, impermeable vapor-retarding membrane that is placed on the earth or granular surface prior to placing the concrete slab. The membrane provides a full capillary break and vapor retarder that prevents the upward migration of moisture through the capillaries that exist in all concrete.

more comfortable environment for building occupants.

As a member of the U.S. Green Building Council, the company has demonstrated how direct-bury, underslab duct eliminates concrete encasement, as well as extra soffit framing, Sheetrock®, and insulation because of improved energy efficiency. Round 19-3/4-, 18-3/4-, and 15-3/4-inch outside diameter (16-, 14-, and 12-inch interior diameter) green Spunstrand duct was specified for the Optimum Performance Home Theatre and rear-projection room air-conditioning application.

The Spunstrand duct system meets all aspects of the Uniform and International Mechanical Codes, carrying an ICBO (International Conference of Building Officials) approval to assure top-quality manufacturing for long-lasting duct, and achieves LEED rating points. Spunstrand fiberglass reinforced plastic duct (FRP) is rated Class 1 and code approved for direct underground burial. Spunstrand duct is manufactured using the filament-wound method, where continuous fiberglass strands are impregnated with resin and machine wound on a mandrel, which has first received a foil scrim kraft surface liner. Winding continues until the desired wall thickness is reached, and then the mandrel with the duct laminate is moved to a heated curing station where it is rotated until the resin is set. The approximate glass content of the filament-wound duct is 70 percent.

The internal surface liner provides the Class 1 rating for this product, while the fiberglass fibers furnish strength, dimensional stability, and temperature resistance. The type of resin is chosen to provide chemical and electrical resistance, color, finish hardness, and thermal properties.

Notably, Sprunstrand has decided to introduce SpunCoustic™, a product developed as a result of the custom design work on our project.

The radiant floor portions of the 5-inch-thick suspended concrete slab and under-slab insulation will be encased at the perimeters with the EnergyEdge® 8-inch Frame Building Rail (EE8fb). The PVC channel provides full-rigid insulation coverage from the top to bottom of an 8-inch slab edge to prevent radiant floor heat loss through the edges of the concrete slab. Below the EnergyEdge will be installed 7-1/4 x 1-1/2 inch R-Control Perform Guard EPS to satisfy California Title 24 insulation requirements for radiant floor slab edges.

Prior to the granular mixture fill, the placement of the DELTA-MS UNDERSLAB membrane, the underslab R-Control Perform Guard EPS, and the Uponor AQUAPEX-encased suspended slab concrete pour, all the underground infrastructure for the home will have been installed. This will include Uponor 1/2- and 3/4-inch red and blue pre-sleeved corrugated AQUAPEX tubing with outer Armacell® AP/Armaflex® pipe insulation, the NuTone® VX1000 central vacuum system, and the complex electrical and low-voltage wiring system encased in conduit. This work is underway and nearing completion.

Uponor's red and blue high-density polyethylene (HDPE) corrugated pre-sleeved 1/2- and 3/4-inch AQUAPEX tubing provides protection for the installation in the soil and allows for easy removal and replacement of the tubing if required. In addition, the red and blue color-coded sleeves easily identify hot and cold waterlines. PEX's flexibility and strength at temperatures ranging from below freezing up to 200 degrees Fahrenheit makes it the ideal piping material for hot and cold water plumbing systems, trouble-free fire-sprinkler systems, and hydronic radiant floor-heating systems. PEX is a cross-linked polyethylene.

Armacell AP/Armaflex® pipe (tube) insulation will be wrapped over the Uponor

Spunstrand® Filament-Wound Fiberglass Underslab Duct

• Spunstrand® HVAC duct is designed for direct burial applications and is manufactured using the filament-wound method to provide the greatest strength.

TrendSetter® Industries' Evacuated Solar Tube Collectors

• TrendSetter® solar-tube systems reduce the water-heating portion of a utility bill by as much as 90 percent. Each of the solar collector arrays are made of 30 non-combustible borosilicate impact-resistant evacuated glass tubes with a copper super-heat pipe and aluminum heat fin within each tube.

AQUAPEX tubing to provide additional thermal insulation. The expanded closed-cell structure of AP/Armaflex pipe insulation makes it an efficient insulation for effectively reducing heat loss on the hot water plumbing and heat gain on the cold water plumbing systems. It is formaldehyde free, low VOCs, fiber free, dust free, and resists mold and mildew, and is made with Microban® antimicrobial product protection for added defense against mold on the insulation. When buried under the suspended slab, the pipe tubing will be channeled through crushed rock rather than through the soil to enhance long-term durability.

Jerry Moyles and his team at Mendocino Coast Plumbing are charged with the installation of the Uponor plumbing system and the Wardflex® flexible corrugated stainless steel fuel gas tubing, which will supply propane to the KitchenAid® Architect Series® II dual-fuel 36-inch-wide range, the Wolf Range Company professional 36-inch-wide griddle, the Kohler® generator, and the Navien® tankless water heater. As well, they are charged with the plumbing for the TrendSetter® solar hot water heating system. This system uses two 6 x 7-feet TS-30 Evacuated Solar Tube Collectors and a 200-gallon TS-200 Solar Thermal Storage Tank manufactured by TrendSetter.

Wardflex corrugated stainless steel tubing (CSST) was selected, as it delivers more advantages over black steel pipe or ordinary CSST systems. Compared to either black steel pipe or other ordinary corrugated stainless steel tubing systems, Wardflex delivers more performance and installation advantages. Using continuous flexible annular corrugated tubing made of 304 stainless steel, Wardflex installs without heavy carrying, threading, extensive measuring, or mess. The tubing is connected using special mechanical fittings. The continuous lengths and amazing flexibility of the fully annealed tubing greatly reduce the number of needed connections (and chances for leaks).

Roger Stevenson and his team at Stevenson Electric are charged with the complete installation of the elaborate and sophisticated electrical and low-voltage electronic systems infrastructure under the home and throughout the interior, including the extensive interfaces, fixtures, controls, and equipment and appliances powered by electricity. This includes the 240-volt assemblies for the Finnleo® Finnish sauna and the Dimension One® Amoré Bay spa, the three 220-volt electric car recharging stations in the garages, and the 240-volt Equi=Tech® 20WQ wall cabinet-mounted balanced AC power unit in the dedicated Optimum Performance Home Theater and two 240-volt Model "5Q" balanced AC power units, one in the library/home theatre/surround music room and the other in the living room.

Michael Galica and his team at Marin Outdoor Living is charged with the installation of the Dimension One Amoré Bay spa.

Engineered Environments'™ Randy Sterns, Brian Hodges, and Tim Johnson are consulting on the electronic systems design and installation of the home's low-voltage infrastructure and technologies.

Engineered Environments is nationally recognized as one of the premiere residential electronic systems firms, providing custom-integrated systems for discerning clientele who appreciate the benefits of properly applied new electronic technologies. Each year, the Custom Electronics Design & Installation Association (CEDIA) presents awards to winning entries submitted from its 3,000 members. The selection process is rigorous, with the judging panel made up of electronic systems contractors and American Society of Interior Designers (ASID) and American Institute of Architects (AIA) representatives. Engineered Environments' track record of winning top awards has spanned each of the past five years.

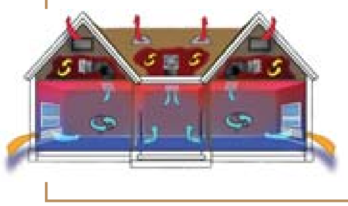
Stevenson Electric will also install the NuTone central vacuum system. The NuTone 1,040-watt cyclonic central vacuum power unit features HEPA-rated filtration, Microban protection, and Teflon anti-stick technology.

Stevenson Electric is further charged with the installation of the two QuietCool™ whisper quiet whole house fans and their companion EnviroCool™ evaporative cooling air system manufactured by Southwest Electric Enterprises, Inc. Unlike conventional air conditioning, QuietCool ventilates homes, removing germs, odors, and indoor pollution and replacing it with healthier outside air. These high-volume fans can remove and replace all of the air in the home 15 to 20 times per hour. The

EnergyEdge® Frame Building Rail

• The EnergyEdge® Frame Building Rail (EE8fb) is designed to provide insulation at the radiant floor perimeters of the concrete slab. The PVC channel provides full-rigid insulation coverage from top to bottom of the slab edge to prevent radiant floor heat loss through the edges of the concrete slab.

QuietCool™ / EnviroCool™



• Unlike conventional air conditioning, QuietCool™ high-volume fans ventilate homes, removing germs, odors, and indoor pollution and replacing it with healthier outside air. Filtered fresh air is drawn in through the EnviroCool™ high-tech space age media and cools the air by as much as 40 degrees.

EnviroCool system allows your home to stay cool for about one tenth the cost of traditional air conditioning. By drawing the fresh air in through the EnviroCool high-tech space age media, the incoming filtered air is cooled by as much as 40 degrees and does so whisper quiet. An evaporative cooling mechanism used with QuietCool fans, EnviroCool can lower the temperature in homes far more efficiently than conventional air conditioners. EnviroCool is one of the most cost-effective "green" addition a homeowner can add. One system will filter and cool the air in the main residence and the other in the second-floor guest quarters and library/home theatre/surround music room.

A 3-inch filtered underground waterline will be installed to serve as a surplus supply of water available from the pond. A standard 2-1/2-inch value red-painted standpipe hydrant with a male National Hose fire-thread fitting will be located at the driveway entrance at the front of the property, to which a fire hose can be connected.

Following the curing of the concrete slab, Nisus Corporation's Bora-Care® will be applied directly to the finished surface slab as a primary termite barrier pretreatment. Bora-Care creates a continuous barrier that termites cannot cross and eliminates their food source.

The next installment in this series of case-study articles will continue to cover the actual work being done to accomplish the tasks described, as well as the start of the above-slab Amvic ICF wall construction. In the meantime, photos and videos will be posted on the *Ultimate Home Design* Web site (www.ultimatehomedesign.com/oph.php), depicting progress in the construction of the first Optimum Performance Home.

Design Concept

As previously noted in this series, the home design integrates all of the concepts advocated in *Ultimate Home Design*. The goal is to demonstrate how modern building products and methods can make life safer, more comfortable, and more enjoyable. The science of optimum performance homes concerns itself with building structures that use less energy, are quieter and more comfortable, have fewer problems with material degradation, provide clean air and water, and do less damage to the environment. As an integrated and holistic design, the house will serve as a durable residence that allows its occupants to age in place. The exceptionally solid structure should last decades with minimal maintenance.

The high-performance building systems employed are designed to exceed California building code requirements and resist natural disasters more effectively than a code-minimum house, even with the new California code requirements that require use of non-combustible or fire ignition-resistant building materials. Constructed with stronger building materials and superior techniques, the home will be safer, allowing homeowners greater peace of mind. The Optimum Performance Home qualifies for the Fortified…For Safer Living® program of the Institute for Business & Home Safety (www.ibhs.org/business_protection). This program specifies construction, design, and landscaping guidelines to increase a new home's resistance to natural disaster.

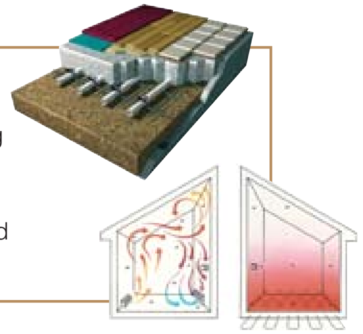
In addition, the home will meet the guidelines and qualifications for the U.S. Department of Environmental Protection's ENERGY STAR®, the EPA's (Environmental Protection Agency) WaterSense™, and the American Lung Association® Health House® programs. It also will meet the requirements of the National Association of Home Builders' (NAHB) National Green Building Standard, the Sustainable Buildings Industry Council (SBIC) Green Building Guidelines, and the "Green Points" program. Sonoma County and The Sea Ranch Association are now considering this program for adoption.

Furthermore, the home's design was the subject of a case study analysis presentation before the Custom Residential Architects Network (CRAN), Full Spectrum Practice Convention of the American Institute of Architects on October 20, 2007 in Chicago, Illinois.

The home is also a case study of the California Energy Commission in terms of energy-efficiency applications and an advanced water-saving plumbing system.

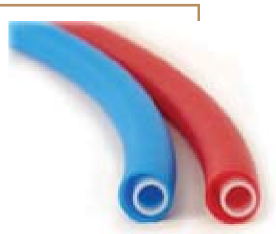
Finally, the home is a national showcase for the Custom Electronic Design & Installation Association, and is the subject of a series of articles

Uponor® Radiant Floors



• Warm water circulates under the floors throughout the Optimum Performance Home using Uponor®'s durable, flexible, and resilient cross-linked polyethylene AQUAPEX tubing, providing a comfortable, even heat without stirring up dust and pollutants.

Uponor® Pre-Sleeved Corrugated AQUAPEX®

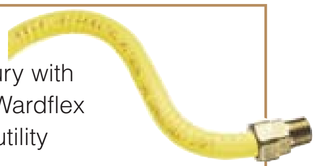


• Uponor® 1/2- and 3/4-inch red and blue high-density polyethylene (HDPE) pre-sleeved corrugated AQUAPEX® tubing is designed for durability and provides protection for installation in the soil and allows for easy removal.

Armacell AP/Armaflex® Pipe Insulation

• The expanded closed-cell structure of Armacell AP/Armaflex® pipe insulation makes it an efficient insulation for effectively reducing heat loss on the hot water plumbing and heat gain on the cold water plumbing systems.

Wardflex® Flexible Fuel Gas Tubing



• Wardflex® is the gas piping system for the 21st Century with the highest overall rated flow capacity in the industry. Wardflex is recognized as the "system of choice" by major gas utility companies.

NuTone® Central Vacuum System

• A NuTone® Central Vacuum System will be featured in the home to help maintain healthy interior air quality. NuTone's central vacuum power units feature a space-saving sleek oval-shaped design, internal sound suppression system, and a status light on the hose handle and power unit, which indicates when the VX™ unit's bag or canister is full and needs emptying.

Bora-Care®

• Nisus Corporation's Bora-Care® is a primary termite barrier pretreatment that creates a continuous barrier that termites cannot cross, eliminating their food source.

on the design and installation of the electronic lifestyle components in the home. These articles are featured in CEDIA's *Electronic Lifestyles*® quarterly magazine.

The Setting

The Sea Ranch is an internationally renowned 5,000-acre environmentally protective residential development situated within a pastoral and forested coastal enclave and nature preserve approximately 110 miles north of San Francisco, California. This stunning development, now celebrating its 43rd anniversary, straddles a 10-mile stretch of Highway 1 along a uniquely beautiful rugged coastline, ending at the northern tip of Sonoma County and the south bank of the Gualala River.

The Sea Ranch is widely regarded as a unique and remarkable residential development. During the 1960s and 1970s, The Sea Ranch was at the forefront of environmentally responsible development. It was conceived and designed by architects and landscape architects who wanted to provide a harmonious mixture of custom homes and pristine natural Northern California landscape in oceanfront, meadow, and forest environments. In fact, The Sea Ranch concept and its architecture are recognized in schools of architecture around the world, and it is frequently used for case studies in environmental and architectural design. The first condominium complex to be built on the southern coastal bluffs of The Sea Ranch is now a registered national architectural site.

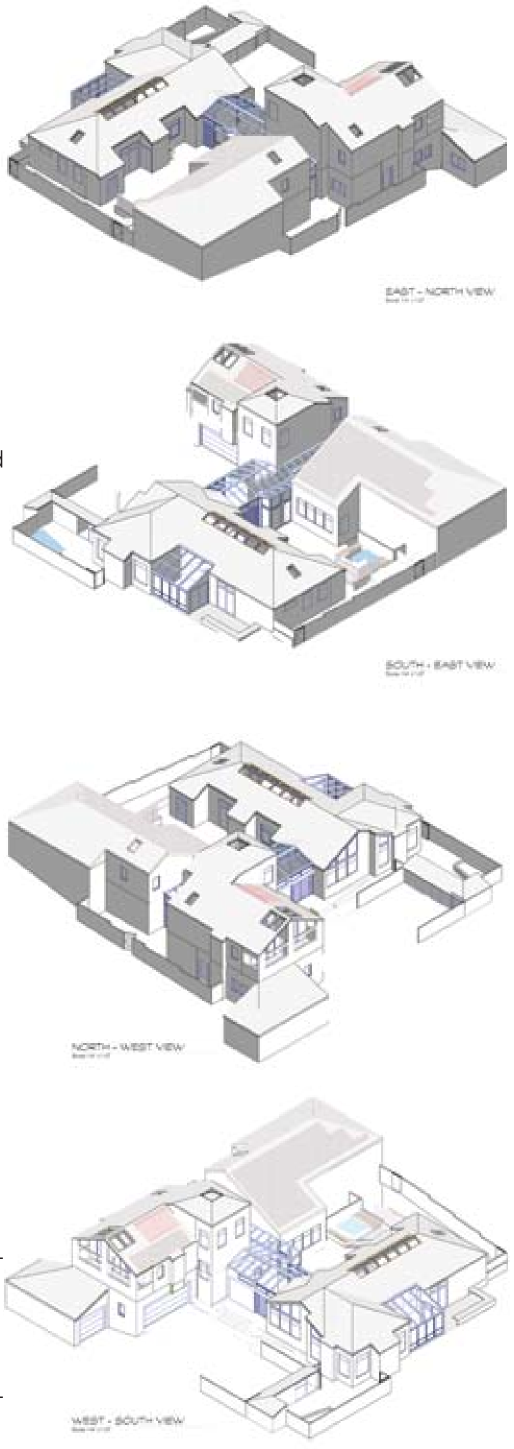
Single-family development occupies approximately 2,500 acres without borderline fences or other visible delineation of property lines. The remaining acres are permanent green-scape commons with 45 miles of nature trails for walkers, bicyclists, and equestrians. Each home is custom designed by an architect/architectural designer following site-specific design guidelines and is situated off a private road network without curbs, sidewalks, or streetlights. The Sea Ranch is a very unique residential development woven into a tapestry of buildings and nature and committed to environmental preservation. The development includes 2,288 lots for single-family custom homes, with 525 remaining to be developed (1,738 already developed and 25 under construction).

The Sea Ranch is managed by The Sea Ranch Association, a Common Interest Development (CID) with an elected volunteer Board of Directors, and supported by numerous volunteer committees. All development on The Sea Ranch is subject to design review and the approval of a Board-appointed autonomous Design Committee. The Design Committee is presently comprised of architects and landscape architects, though it does not include anyone with experience in vegetation management or "green" sustainable building design. A legal set of Covenants, Conditions, and Restrictions (CC&Rs) govern the development and are designed to protect The Sea Ranch concept.

The Home

The Sea Ranch Design Committee imposes upon designers architectural building blocks derived from the original rural structures found on the northern California coast. Designers are expected to apply their creativity to render various arrangements and deviations to arrive at a custom solution that specifically responds to the site. Successful proposals submitted to the Design Committee address the issues of passive solar positioning, wind, glazing (window) layout, privacy between neighbors, vegetation protection, view preservation, topography and grade changes, roof slopes, appropriate exterior materials and finishes, and other exterior design considerations—all within the building and site design.

A focus of the Optimum Performance Home's design is to stand as a showcase for the "green" movement and demonstrate means of reducing a home's impact on the planet through the use of Low-Impact Development and environmentally responsible and sustainable building materials. It is hoped that the home will become a case study for a "Green Points Program" suited to the scale of The Sea Ranch.



Four Perspective Views of the Optimum Performance Home at The Sea Ranch

The home's 3,272-square-feet living space (4,441-square-feet total building "footprint," including garages, covered walkways, courtyard, and decks) is arranged in a three-building compound using a well-sealed, well-insulated, super-tight building envelope that reduces temperature fluctuations and enhances overall energy efficiency. This arrangement provides for an alcove courtyard protected from the prevailing northwest wind. The home is designed with differing spatial experiences throughout to encourage exploration. The home will display innovative interior design and be furnished in a contemporary Frank Lloyd Wright style appropriate to its dimensions. The home design connects the indoors and the outdoors with covered walkways, a courtyard, decks, and a garden to expand livable space, without requiring heating or air conditioning. The home is designed in accordance with biophilic design principles with abundant and excellent use of natural light and natural indigenous landscaping planned. {For an in-depth analysis of the biophilic attributes of the home, please read "Biophilic Design," "Biophilic Design Attributes," and "The Interior Design Process, Part I: Synthesizing Sustainability, Universal Design, And Technology" authored by Julie Stewart-Pollack in Issue 3 (May/June 2006), Issue 4 (July/August 2006), and Issue 10 (July/August 2007), respectively.}

The main-floor living area is designed to accommodate the capabilities of all occupants without any challenging physical barriers, even for the elderly and disabled. The home design features a ground-level open plan for the living room, dining room, master bedroom suite, and spacious kitchen with solarium, exhibition cooktops, and home management system.

The second building in the compound is designed to accommodate a large state-of-the-art Optimum Performance Home

Zurn® Flo-Thru Trench Drain

• The modular Zurn® molded-slop Flo-Thru trench drain is designed for load-bearing strength, hydraulics, chemical resistance, and structural integrity.

Theatre with integrated rear-screen projection room and a home office.

The third building will include a two-car and boat garage, workshop, main-level guest bathroom, and laundry room. The second level of this building will have two guest bedrooms, a bathroom, and a dedicated library/home theatre/surround music room distinguished by a high-tower feature. To insure universal access to this floor, the design provides for an Otis® Gen2 residential elevator.

The entrance and walkways that connect the three buildings and the solarium will be enclosed with insulated- and solar gain-reduced-tempered glass. There will be a seating area at the vestibule entrance to the home. The main entrance vestibule will serve as an oversized mudroom. The driveway, area around the garage, guest parking, and entrance to the home—as well as all paths—are designed in accordance with The Sea Ranch guidelines governing exterior hard-surfaced paths. All such surfaces are pervious to virtually eliminate water runoff. The surface will be packed with decorative crushed rock to enhance the natural appearance of the home's setting. There also will be a dedicated equipment room off the courtyard, which accommodates the Uponor and WaterFurnace radiant-heating apparatus, TrendSetter solar hot water storage tanks, Navien's 98 percent condensing on-demand propane-fired tankless water heater, and other equipment. The backup Kohler® generator is housed within a separate weather-resistant tower located off the north wall of the two-car garage and guest bedroom, within the fenced dog run. This tower is designed to optimize the north-west wind performance of the PacWind® Seahawk® vertical-axis Savarrieus™ wind turbine disguised within (see Part XII, Issue 12, November/December 2007).

The home site is nestled on an almost-acre parcel at the edge of a forested area of the southern section overlooking the Pacific Ocean, offering distant water views. The orientation of the home on the site is designed to take advantage of natural lighting and passive solar heating and cooling. Good site and land planning will result in minimal land disturbance and preservation of natural features and environments.

Landscaping will consist of The Sea Ranch-approved indigenous vegetation with low water requirements and unique water conservation features, including two ponds and a stream supported by rainwater catchment and captured runoff. Site grading has been specifically planned to enhance the project's placement in the watershed, and the design incorporates the principles of Low-Impact Development to minimize runoff from impervious surfaces and mimic the natural hydrology in overall effect. The resultant water harvesting will then minimize the use of irrigation, and the increased infiltration and retention will passively support the native landscape. Additionally, a gray water system will be used for undersurface plant irrigation.

Next

With site preparation and foundation construction well underway to completion, this continuing series of articles will focus on the design elements as they pertain to each stage of construction as the project progresses, and will include coverage of the technologies and building systems and the materials used and applied to construct the first Optimum Performance Home. UHD

The Author

Gary Reber is the President of Ultimate Home Design, Inc. and the founding Editor-In-Chief and Publisher of *Ultimate Home Design*®, The Green Build And Universal Design Resource™. He is also President of WSR Publishing, Inc, which publishes *Widescreen Review*®, The Essential Home Theatre Resource™. His diverse background in several fields includes an undergraduate, graduate, and postgraduate university education in architecture, community planning, and economic development planning. For years he was a consultant on community and economic development planning. For the past 15 years he has been an editor and publisher of magazines in the consumer electronics and architectural fields. Gary can be reached at 951 676 4914 or gary@ultimatehomedesign.com.

Product And Contact Information

• AFM Corporation, R-Control, 211 River Ridge Circle, Suite 102A, Burnsville, Minnesota 55337, 952 474 0809, www.r-control.com
• Amvic, Inc., 501 McNicoll Avenue, Toronto, Ontario, Canada M2H 2E2, 416 410 5674, www.amvicsystem.com
• Aqua Harvest International, 3628 Greystone Ridge Court, Rio Rancho, New Mexico 87124, 505 975 5008, www.aquaharvestonline.com
• Armacell LLC, 7600 Oakwood Street Extension, Mebane, North Carolina 27302, 800 866 5638, www.armacell.com
• Bartlett Mechanical Services, 6755 Oak Street, Anderson, California 96007, 408 313 2486, www.bartlettmechanical.com
• Bed Rock Concrete Pumping, P.O. Box 503, Point Arena, California 95468, 707 882 2637
• Bed Rock Products, Inc., 135 Hay Parkway, Point Arena, California 95468, 707 882 2323
• Bill Wilson Environmental Planning & Design, LLC, 71 Del Casa Drive, Mill Valley, California 94941, 415 383 2919, 805 689 7639
• Broan-NuTone, 926 West State Street, Hartford, Wisconsin 53027, 800 548 0790, www.nutone.com
• California Portland Cement Company, 2025 East Financial Way, Glendora, California 91741, 800 272 9119, www.calportland.com
• Carlisle Coatings & Waterproofing, Inc., 900 Hensley Lane, Wylie, Texas 75098, 800 527 7092, www.carlisle-ccw.com
• Conti Materials, P.O. Box 30248, Stockton, California 95213, 209 467 0626, www.contimaterials.com
• Cosella-Dörken Products, Inc., 4655 Delta Way, Beamsville, Ontario, Canada L0R 1B4, 905 563 3255, www.cosella-dorken.com
• Dimension One Spas, 2611 Business Park Drive, Vista, California 92081, 800 345 7727, www.d1spas.com
• EchoStar DISH Network, 9601 South Meridian Boulevard, Englewood, Colorado 80112, 888 825 2557, www.dishnetwork.com
• Energy Edge, 7701 East Kellogg, Suite 722, Wichita, Kansas 67207, 316 618 1983, www.energyedgeform.com
• Engineered Environments, 1250 Marina Village Parkway, Alameda, California 94501, 510 521 7500, www.engineeredenviornments.com
• Equi=Tech Corporation, 18258 Redwood Highway, Selma, Oregon 97538, 877 378 4832, www.equitech.com
• Euclid Chemical Company, 19218 Redwood Road, Cleveland, Ohio 44110, 800 321 7628, www.euclidchemical.com
• Feeney Construction, 14660 McCourtney Road, Grass Valley, California 95945, 530 477 7647, 707 884 9458
• Finnleo Sauna & Steam, 575 East Cokato Street, Cokato, Minnesota 55321, 800 346 6536, www.finnleo.com
• FORTA Corporation, 100 Forta Drive, Grove City, Pennsylvania 16127-6399, 800 245 0306, www.fortacorp.com
• GetWireless LLC, 10901 Red Circle Drive, Suite 325, Minnetonka, Minnesota 55343, 800 990 9025, www.getwirelessllc.com
• Gutter Helmet/Southeastern Metals (SEMCO), 1180 Industry Drive, Jacksonville, Florida 32218, 904 757 4200, www.gutterhelmet.com
• Hacker Industries, Inc., 610 Newport Center Drive, Suite 250, Newport Beach, California 92660, 800 642 3455, www.hackerindustries.com
• Headwaters Resources, 10653 South River Front Parkway, Suite 300, South Jordan, Utah 84095, 888 236 6236, www.flyash.com
• iBeam Systems, Inc., 280 North 8th Street, Suite 30, Boise, Idaho 83702, 800 403 0688, www.ibeamsystems.com
• Kryton Canada Corporation, 8280 Ross Street, Vancouver, B.C., Canada V5X 4C6, 604 324 8280, www.kryton.com
• Marin Outdoor Living, 2100 Redwood Highway, Greenbrae, California 94939, 415 924 8811, www.marinoutdoorliving.com
• Mendocino Coast Plumbing, P.O. Box 41, Manchester, California 95459, 707 882 2628, 707 353 2628.
• Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois 60077, 847 966 6200, www.cement.org
• QuietCool, Inc./Southwest Electric Enterprises, Inc., 31235 Loretta Road, Winchester, California 92596, 888 784 3826, www.freshac.com
• Rainhandler/Savetime Corporation, 2710 North Avenue, Bridgeport, Connecticut 06604, 800 942 3004, www.rainhandler.com
• Robert Swegle, P.O. Box 3, 38225 Old Stage Road, Gualala, California 95445, 707 888 6996
• Seepage Control, 7301 West Boston Street, Chandler, Arizona 85226, 800 214 9640, www.seepagecontrol.com
• Smart Drain, Drawer 2219, Columbia, Maryland 21045, 800 638 8582, www.smartdrain.com
• Sonoma County Builders, Inc., 6280 Old Redwood Highway, Santa Rosa, California 95403, 707 837 2997 / P.O. Box 244, Point Arena, California 95468, 707 684 9144
• Spunstrand Incorporated, 620 North Post Street, Post Falls, Idaho 83854, 208 665 7444, www.spunstrand.com
• Steve Glaze Backhoe, 2766 Parkview Drive, Lakeport, California 95453, 707 263 3055
• Steve Michelson Productions, Lobitos Creek Ranch, 2800 Lobitos Creek Road, Half Moon Bay, California 94019-2547, 650 726 2460, www.lobitoscreekranch.com
• Stevenson Electric, 1340 Highway 4, P.O. Box 2642, Arnold, California 95223, 209 768 2100
• StormTech, 20 Beaver Road, Suite 104, Wethersfield, Connecticut 06109, 888 892 2694, www.stormtech.com
• Stormwater Solutions, LLC, 3940 Laurel Canyon Boulevard, Suite 856, Studio City, California 91604, 866 786 7690, www.stormh2osolutions.com
• ThermaSAVE/IHSN, Inc, 4002 Helton Drive, Florence, Alabama 35630, 256 766 3378, www.thermapanel.net
• Tom Swegle, 707 849 7131
• Uponor North America, 5925 148th Street West, Apple Valley, Minnesota 85254, 800 321 4739, uponor-usa.com
• Wardflex, 2085 West Avenue 140th, San Leandro, California 94577, 415 971 1531
• WaterFurnace International, Inc., 9000 Conservation Way, Fort Wayne, Indiana 46809, 800 222 5667, www.waterfurnace.com, www.stormh2osolutions.com
• Weeks Drilling & Pump Company, 6100 Highway 12, Sebastopol, California 95472, 707 823 3184, www.weeksdrilling.com
• WildBlue Communications, Inc., Greenwood Corporate Plaza, Building. 1, 5970 Greenwood Plaza Boulevard., Suite 300, Greenwood Village, Colorado 80111, 866 945 3258, www.wildblue.com
• Wonderwater, P.O. Box 1510, Mt. Shasta, California 96067, 530 926 5050, 530 925 2586, www.wonderwater.net
• Zurn Flo-Thru Operation, 116 Molly Rex Lane, Mooresville, North Carolina 28117, 704 799 7087, www.zurn.com

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Building Green, Sustainable, Affordable Homes For The Masses

Being "green" isn't easy, but everyone can do their part.

Clark Wilson

synopsis

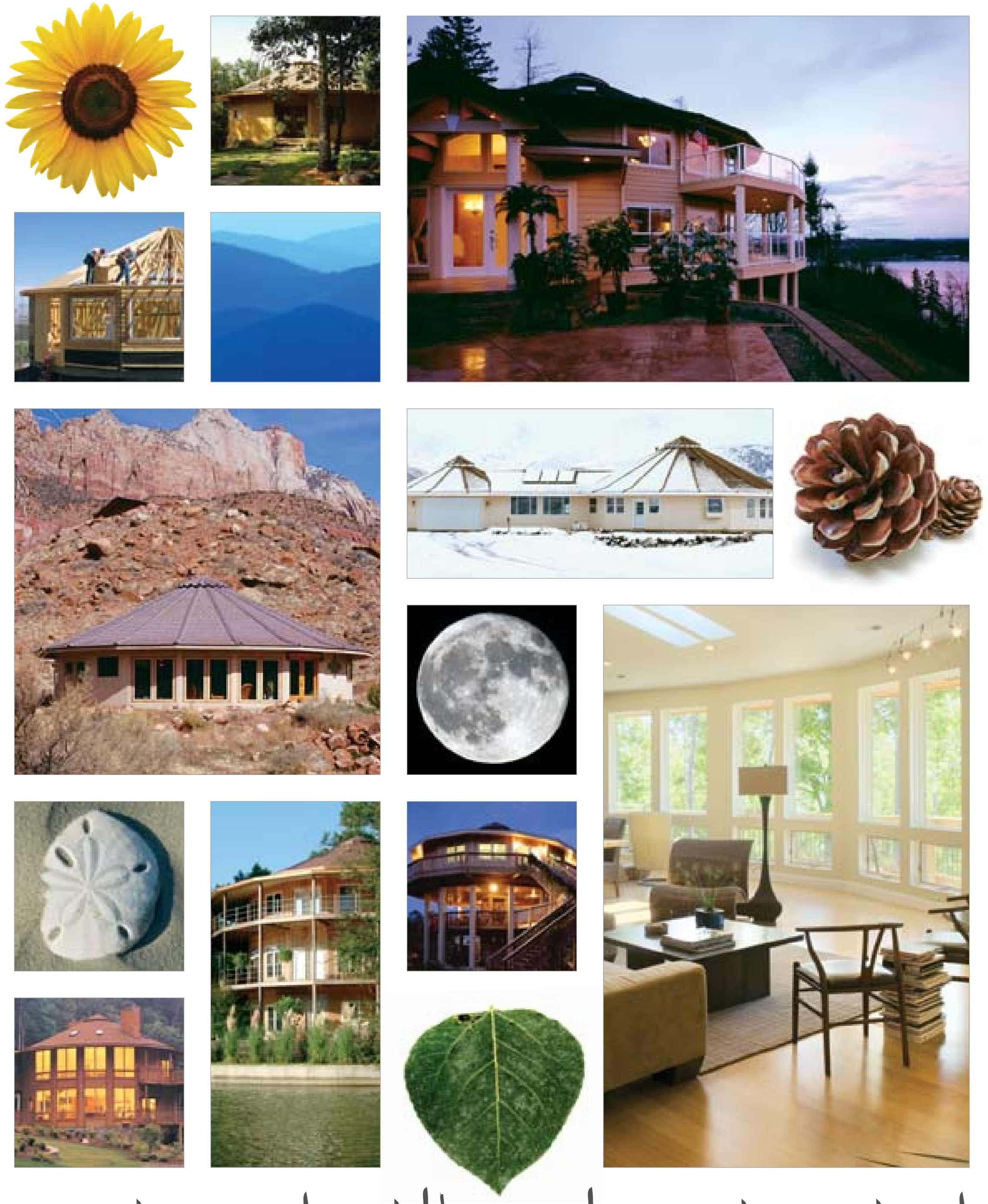
- Green Builders' idea is to build homes that are efficient, comfortable, healthy, and attractive all at the same time, with people-friendly, and earth-friendly features and options.
- Our mission at Green Builders is to develop sustainable communities with homes that help residents live "green," healthy lifestyles while treading lightly on the earth.
- Green Builders homes incorporate our proprietary Green Sense program featuring the four pillars of "green": energy efficiency, water conservation, earth sensitivity, and health consciousness—all of which save homeowners hundreds of dollars each month.
- At Green Builders, we know that if "going green" requires too much effort, it may not happen. That's why we prescribe simple steps that homeowners can take to "greenify" their lifestyles and their homes.

There is no denying that we, as a nation, have come together to focus on how to live and embrace being "green." That said, "green" living for most people today involves individual choices about transportation, food, consumer products, recycling, and energy/water conservation around the house. What we fail to realize is that much of the environmental impact, energy usage, and water consumption in a person's life occurs in the building and monthly operation of their home. Unfortunately, "green" homes are mostly still the province of custom builders who build them one by one—making them cost prohibitive for the average mainstream home buyer. As a result, large-scale green residential communities are almost nonexistent. But, that's quickly changing with the need for, and rapid development of, sustainable communities that post very minimal negative impact on the environment.

"Green" living is no longer for a select few—we simply can't afford it to be. Green Builders' idea is to build homes that are efficient, comfortable, healthy, and attractive all at the same time, with people-friendly, and earth-friendly features and options. All of these things make a home last longer and appreciate faster. And, nothing is greener than that.

Being "Green" Isn't Easy

Incorporating all of these elements isn't always easy. However, while there is plenty of undeveloped land to develop indiscriminately, our mission at Green Builders is to develop sustainable communities with homes that help residents live "green," healthy lifestyles while treading lightly on the earth.



designed with nature in mind.

Deltec Homes are made to work with nature, not against it. Our unique circular design combines strength with beauty, for homes that are energy-efficient, eco-friendly, and resistant to hurricane winds and other extreme climate conditions.

Even better, you'll love how your Deltec home heightens your feeling of connection to the outdoors, with light-filled interiors and window styles that showcase panoramic views.

Call or visit us online to order your free brochure — and learn more about how Deltec is reshaping the way we live.

deltec HOMES™ The Original Green Builder

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"Unfortunately, "green" homes are mostly still the province of custom builders who build them one by one—making them cost prohibitive for the average mainstream home buyer."

Accomplishing this successfully requires a delicate mix of partnerships, design, technology, and materials. Ninety percent of "green" building takes place in the first 10 percent of the building process. When you assimilate these sustainable construction techniques correctly from the get-go, you end up with a "green," large scale, yet affordable community, like Georgetown Village in Georgetown, Texas. Green Builders homes in Georgetown Village are "green" from the ground up; they are designed to be beautiful, healthy, long-lasting, and most significantly: affordable.

The Four Pillars Of "Green"

As President and CEO of Green Builders, Inc. and a longtime developer and home builder, I understand the importance of working with environmental groups such as the Environmental Protection Agency's ENERGY STAR® program, and home building associations like the National Association of Home Builders (NAHB) to develop an industry standard in home building.

Each of our homes incorporate our proprietary Green Sense program featuring the four pillars of "green": energy efficiency, water conservation, earth sensitivity, and health consciousness. All of which save homeowners hundreds of dollars each month.

Energy

Cooling and lighting a home are the most expensive and energy-consuming aspects of running a household. Reduced energy consumption conserves resources and money. As a result, each of our Green Builders' homes incorporates a number of smart, natural methods to generate and save energy.

• Each home is situated on an east/west axis to limit the amount of direct sun exposure.

• Overhangs or awnings provide additional shade to decrease solar heat gain.

• Light-colored natural stone from local quarries is used as it absorbs less heat and requires less energy to be transported to the homesite.

• Efficient home design eliminates unnecessary square footage, and scaled ceiling heights are utilized.

• Compact fluorescent light bulbs are installed in every light fixture.

• Energy-efficient HVAC equipment, including a 14 SEER heat pump, centrally located in an insulated cavity, is zoned and sized appropriately for each house. Systems are tested after installation to assure proper operation and less than 6 percent duct leakage. And the system uses Puron, which will not damage the ozone.

• Conduits for future solar-panel installation are installed as standard.

Water

We understand the vital importance of water conservation, especially in drought-prone areas like Austin, Texas, and address the needs of those living in these areas and the future needs of buyers yet to come.

• Low-flow showerheads and toilets cut water usage by half.

• ENERGY STAR appliances use 10 to 15 percent less energy and water.

• Custom-programmable sprinkler systems with rain sensors are installed, so water can be dispensed when needed, rather than according to an arbitrary schedule.

• Native landscaping and hydro-zoning are used.

• Rainwater collection systems reuse naturally collected water. In addition, homeowners have the option of incorporating a water-filtration system to make the collected water potable.

• Direct-vent tankless water heaters are installed in every home, ensuring that heated water is provided on an as-needed basis.

Earth

From the media to our educational system, we are taught that the Earth's resources are vital to our survival. With new developments showing that we are depleting our Earth of the elements we will need to survive in the long term, we wanted to come up with a wise and thoughtful way of making sure that these resources will be available for an indefinite amount of time. As a result, we use building materials that are grown and harvested in a sustainable manner, while making good use of innovative recycled options.

• Shingles with a 30-year rating mean they won't need to be replaced for decades, and therefore, won't be added to our landfills.

• Spray foam insulation is made from environmentally friendly raw material and seals better than other insulation, also reducing monthly utility bills by up to 50 percent.

• Engineered, recycled lumber is used whenever available.

• Flooring options include sustainable materials like bamboo, recycled tile, and recycled carpet with non-toxic glue.

• A base cabinet in the kitchen holds recycling containers.

• Low-volatile organic compound (VOC) paints are used, which release few or no pollutants

• We encourage "green" furnishings and accessories and provide a variety of resources for these products from local and national retailers

Health

There is no denying that good health begins with clean air. Because of this, we make sure that we generate and preserve exceptional air quality throughout our homes by reducing humidity—and therefore allergens—wherever possible. This is vitally important in central Texas, arguably the allergy capital of the country.

• Foam roof and wall insulation reduces humidity and lessens the possibility of mold, pollens, and other allergens.

• Front-loading washing machines are encouraged, as they generate less humidity in the home.

• Exhaust fans in kitchen, bath, and utility rooms remove humidity.

• Cabinets and carpets are made and finished with materials that greatly reduce off-gassing to improve the quality of the air inside the home.

• Attic fans are not used because they promote humidity and draw the cooled air out of the home.

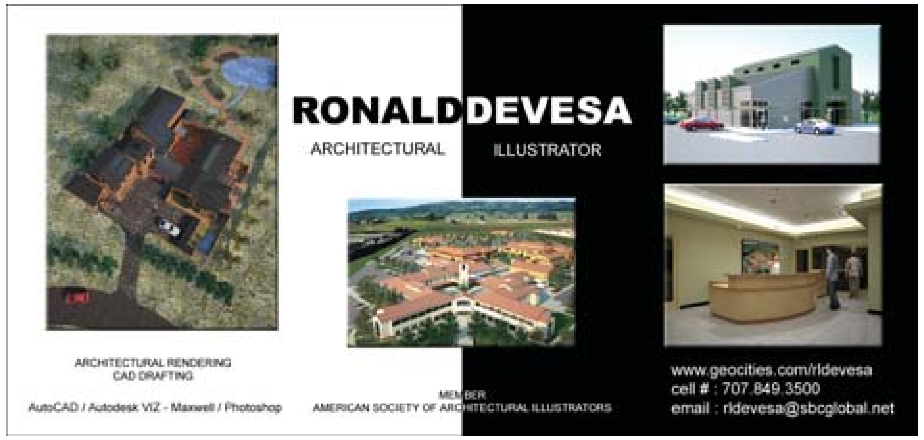
• Proper grading insures that water drains away from the home, reducing the possibility of mold and insects.

• Garages are detached or vented to make sure exhaust fumes don't migrate into living areas.

Being "Green" Isn't Just A Construction Thing…We Go To IKEA®—You Can Too

In addition to building sustainable homes from the ground up, we've recently introduced a program in our communities that allows our homeowners to furnish their Green Builders home with eco-furnishings and accessories from large national suppliers such as IKEA® and Natural LEE Furniture, as well as local boutiques like Loft and Austin Furniture Consignment. This is something you can do too.

Our goal is to spread the message that living green is simple, and that everyone, no matter the demographic, can incorporate "green" principals into their lives. From our home's cabinets, paint, and countertops to the furniture, bath towels, and accent accessories, Green Builders makes sure that the furnishings and decorations we offer in our homes come from sources



For more information on this advertiser, circle 10

that support local and worldwide economic and social growth and maintain a level of environmental consciousness.

The participating furniture sources are committed to reducing impact on the environment and helping consumers cultivate organically rich lifestyles through the purchase of sustainable and socially responsible products. For example, Natural LEE donates one tree to American forests for every piece of furniture sold, The Loft offers furniture and case goods made from renewable FSC-certified forests, and IKEA uses fewer raw materials, generating less waste and discharge in manufacturing, as well as wood, which is recyclable, biodegradable, and renewable.

We Make It Simple

At Green Builders, we know that if "going green" requires too much effort, it may not happen. That's why we prescribe simple steps that homeowners can take to "greenify" their lifestyles and their homes. These include starting on a micro level by replacing incandescent light bulbs with compact fluorescent ones; installing low-flow toilets and showerheads instead of water guzzlers; and adding awnings to windows to shield homes from the western exposure of the sun.

On a macro level, developers can also take a note from our approach to home building. Typically, green homes are custom built and as a result, only available for the wealthy few who can afford to build such a home. It does not have to be this way. We, at Green Builders, have figured out how to build these "green" homes and communities at affordable prices. If other developers would examine and begin to incorporate Green Builders' practices into their homes, they too would join us in making a difference.

Making A Global Difference

We're just one part of a global change, but we're doing our best to share our experiences and ideas with everyone. "Green" is bipartisan. It is the future. And, it's something that everyone at every level can do.

The Author

Clark Wilson has served as President and CEO of Green Builders, Inc. since May 2005. In 2002, Mr. Wilson served as a principal in Athena Equity Partners-Hays, L.P., a Texas limited partnership that specializes in commercial real estate investments, which merged with Wilson Family Communities in May 2005. He served as the President and Chief Executive Officer of Clark Wilson Homes, Inc., a subsidiary of Capital Pacific Holdings, from 1992 to 2002. He has nearly 25 years of experience in the home building industry. For more information on Green Builders and Clark Wilson, please visit: www.greenbuildersinc.com.

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For more information on this advertiser, circle 12

New York City's First LEED® For Homes Certification

Teddy Schiff

synopsis

✎ Townhouses in New York City offer a rare and different form of urban living: they allow the user to bring suburban elements into an urban setting, offering more privacy than any other form of urban residential living.

✎ There are so-called "green" single-family town homes in New York City, but none of them are LEED certified nor would they stand up to the comprehensive requirements, which LEED for Homes has established.

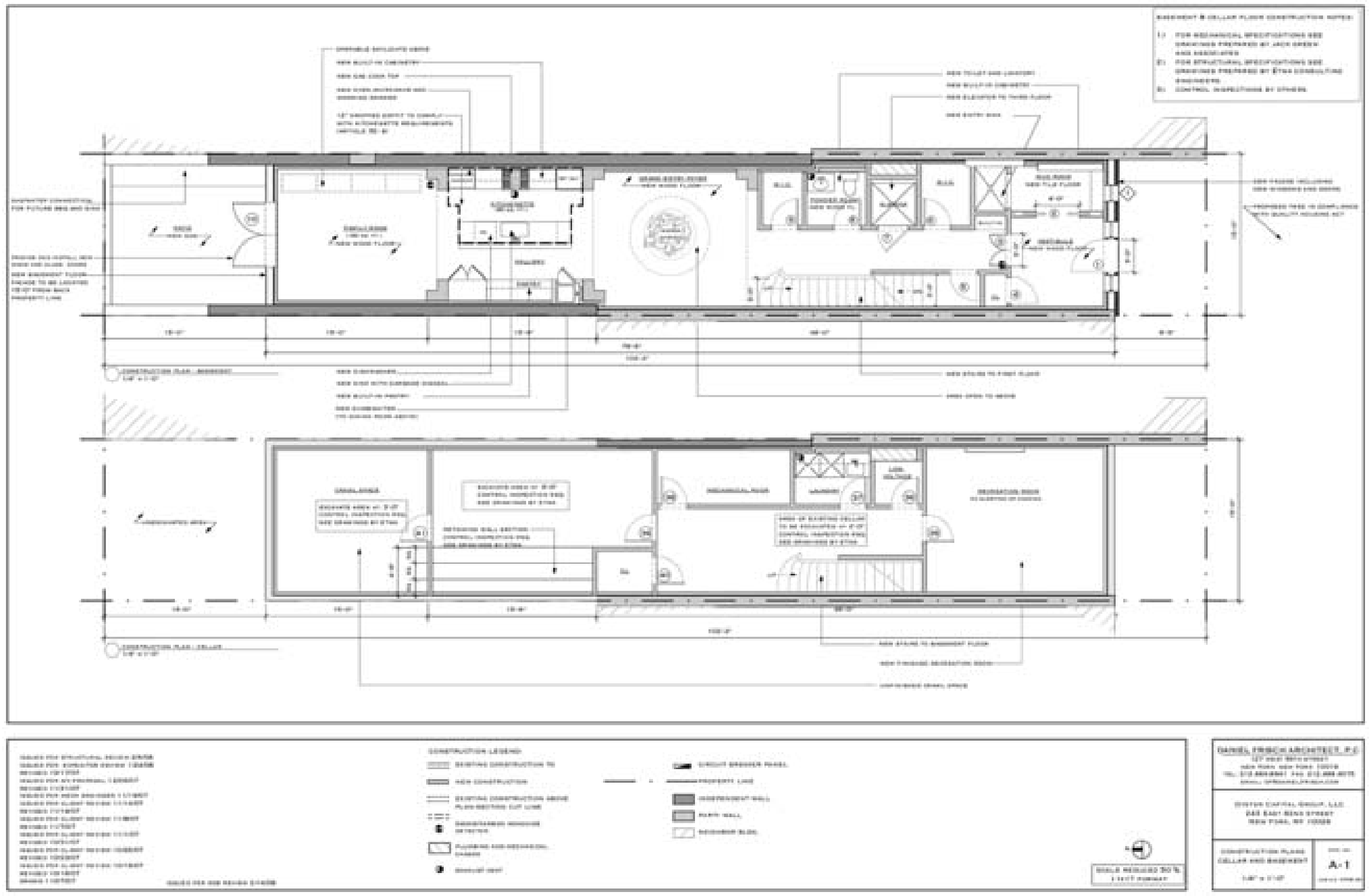
✎ The goal is to create a high-end townhouse, which raises the visibility platform of an individual property by making it both exceptionally aesthetically pleasing, while also drastically enhancing indoor air quality and reducing the homes impact on its local environment.

Oyster Capital Group is a residential development firm based in New York City that is making a big bet on a new building program under the U.S. Green Building Council's Leadership In Energy & Environmental Design umbrella called LEED® for Homes. "There have been plenty of new condominium and office buildings erected recently in Manhattan, which have had varying levels of LEED certification, but New York City has yet to see a single-family townhouse designed with the socially responsible consumer in mind," says Teddy Schiff, President of Oyster Capital Group.

Townhouses in New York City offer a rare and different form of urban living. They allow the user to bring suburban elements into an urban setting, offering more privacy than any other form of urban residential living. Townhouses typically have more livable square footage, outdoor spaces, and fireplaces than other forms of urban residential living. Oyster Capital Group recognized this lack of supply in the townhouse market and researched the feasibility and implementation of adapting an existing small building to the LEED for Homes rating criteria. There are so-called "green" single-family town homes in New York City, but none of them are LEED certified nor would they stand up to the comprehensive requirements, which LEED for Homes has established. The goal is to create a high-end townhouse, which raises the visibility platform of an individual property by making it both exceptionally aesthetically pleasing, while also drastically enhancing indoor air quality and reducing the homes impact on its local environment.

With the help of Karla Donnelly at Steven Winter Associates, Inc., a USGBC LEED for Homes provider and sustainability consultant (New York, District of Columbia, and Connecticut based), Teddy Schiff and architect Daniel Frisch of Daniel Frisch Architecture set out to design and build the first LEED for Homes-certified free-standing townhouse in all of Manhattan. They broke the project down to three distinct segments: preplanning and site

What Existed	Issues To Consider/Integrate	What Is Being Created
• 2,700 SF • Mixed Use • Four Floors • 15-Feet Wide • No Outdoor Space • One Non-Working Fireplace • Inefficient Core Layout • Under-built • Bad Facade • Poor Use Of Light And Air Exposure • No Elevator • Oil Heating System • Individual Unit A/C • Poor Electrical Wiring • No Alarm System • Water Damage • Poor Joist Support • Traces Of Asbestos	• Utilize Maximum Buildable Area • Examine "Highest And Best Use" Which Is A Single-Family Home • Obtain A New *Certificate Of Occupancy* • Create One To Three Gas Fireplaces • Redesign The Core To Maximize Floor Plate Layout • Create A New Facade From Cast Stone And Limestone • Completely Gut Renovate To Create A High-End Product • Attain LEED For Homes Silver Or Higher Rating	• A Gut Renovated 4,300 SF Single-Family Home With No Retail On The Ground Floor • Five Floors • Four Bedrooms • Three Outdoor Spaces Totaling 1,200 SF • Three Gas Fireplaces • High-End Kitchen And Bathrooms • A Personal Elevator • The First LEED-Certified Townhouse In Manhattan (Projected To Be LEED Gold) • Efficient Use Of The Core, Which Maximized Light And Air, Creating A Wider Feel To This 15-Foot-Wide Property • Gas Heat • New HVAC System • Central Vacuum Cleaner System • All Entertaining Rooms Wired For Surround Sound And Recessed Speakers • All Rooms Wired For Cable/Internet/Phone • High-End Security System • Repolished "NYC Facade" • *Certificate Of Occupancy* Change To Strictly A Residential Use



analysis, design and schematics, and finally, implementation and execution.

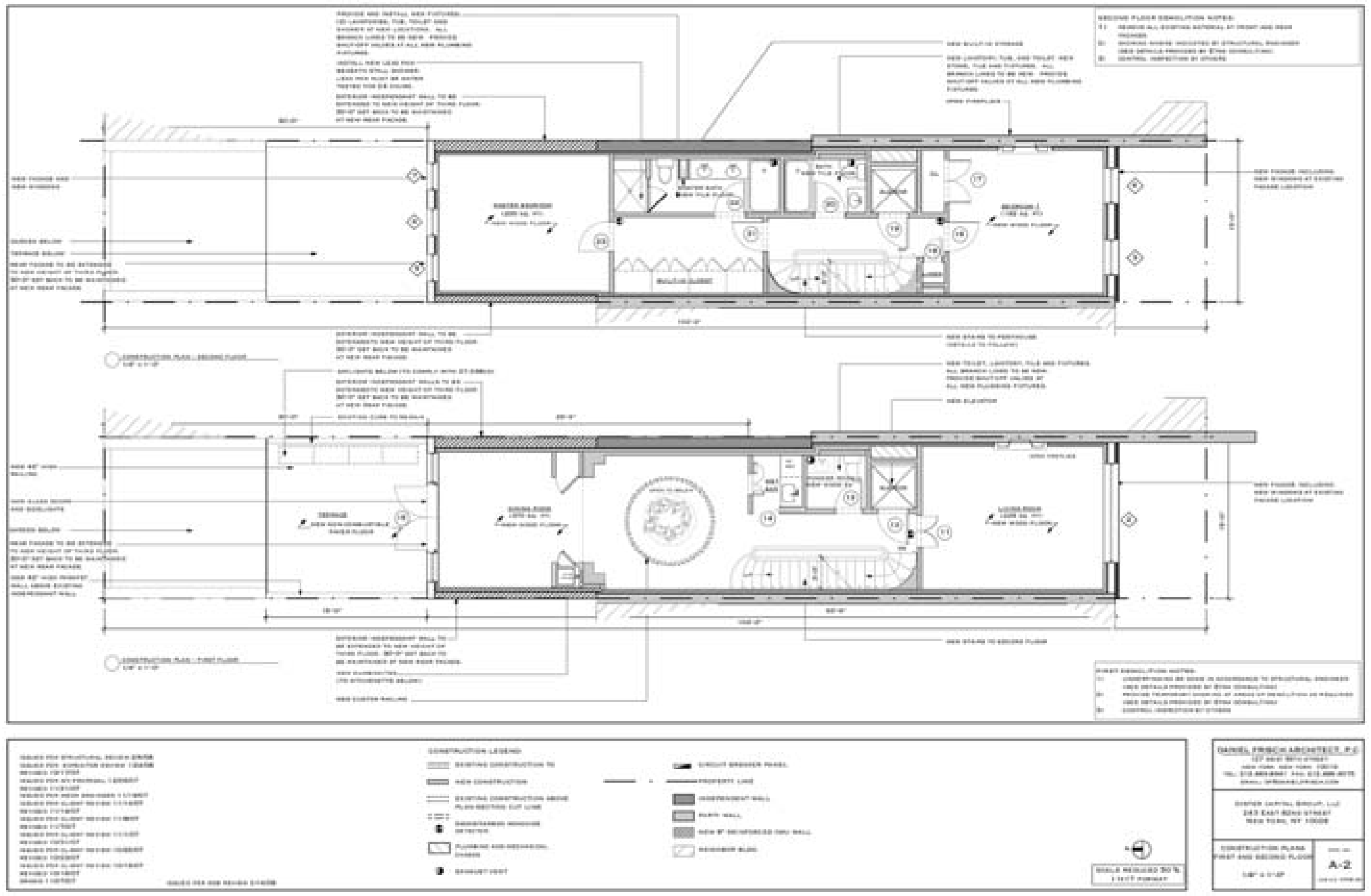
The first step was to assemble the right team. Because this method of building is so new to many in the field, it was important to choose the correct mix of team members with the appropriate level of experience. Jack Green Associates was brought on as the mechanical engineer, Etna Consulting did the structural engineer work, Midtown Technologies was responsible for the low-voltage consultation, and Mac Carbonell from Verdant Garden Design was brought on as the landscape architect. Once all the right people were on board, it was time to discuss the goals of the project and target the LEED for Homes criteria appropriate and applicable for this project.

The chosen infill site already picked up points for meeting certain "Location and Linkage" credits, such as avoiding environmentally sensitive areas, site location within a half a mile of existing water and sewer, as well as site location within a quarter mile of publicly accessible green space. The team then overlaid the LEED rating system requirements with the newly drawn up floor plans and design layouts, which architect Daniel Frisch and team had painstakingly reworked.

Lead architect, Daniel Frisch, was very deliberate in choosing finishes and materials that were considered "environmentally preferable" products. Stains and treatments that do not comply with this philosophy were not used. "We enjoy both the learning process and the dialogue that comes as new materials are developed and refined. While we welcome the opportunity to design this new high-end townhouse, it is the chance to simultaneously incorporate 'green' technologies and to participate at the forefront of 'green' concepts, which we find so exciting," says Daniel Frisch. No tropical hardwoods were considered unless they were Forest Stewardship Council (FSC) certified (including Luan, which is commonly found in cabinets and flooring). When choosing flooring, carpet, paint, cabinets, and countertops, the team had to be very conscious of the LEED for Homes requirements, including:

- No-VOC interior paints and primers
- Low-VOC, formaldehyde insulation
- Water-based adhesives, sealants, calks, foams, and coatings
- No added urea-formaldehyde binders when choosing cabinetry, countertops, or trim
- At least 25 percent post-consumer recycled-content roof shingles, flooring, tiles, and countertops
- A laundry list of other materials that were locally (within 500 miles) harvested, extracted, and manufactured

The developers chose numerous materials, finishes, and equipment—all

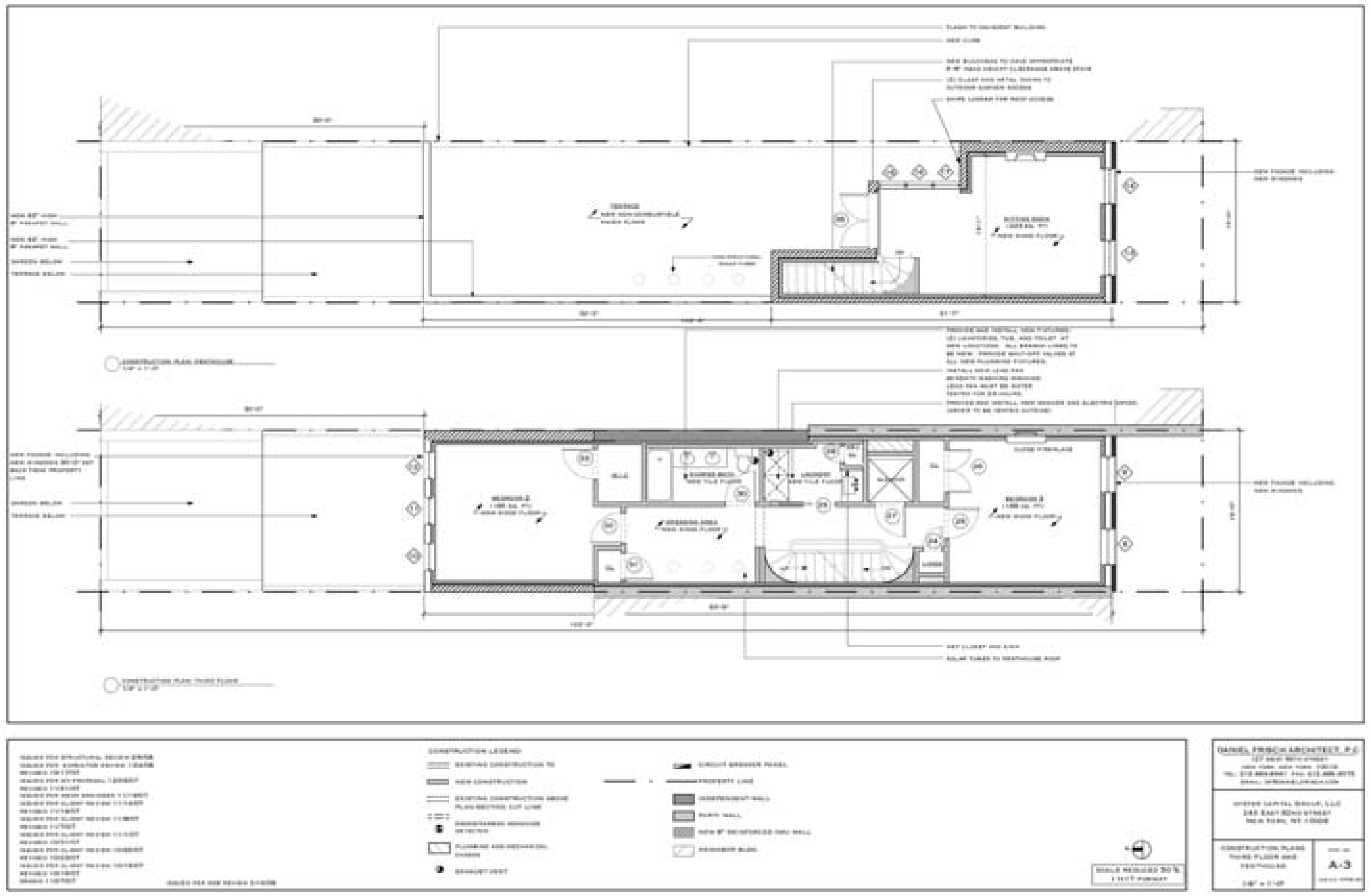


of which promote sustainability. The entire 4,250 square feet of interior flooring will be Carlisle Wood reclaimed oak flooring, treated with a non-toxic stain. The countertops in the kitchens and bathrooms will be IceStone, which is made from recycled glass and concrete. The chemical composition is 99.5 percent inorganic, making it very safe from the standpoint of toxicity and fire resistance.

Installation of high-efficiency showerheads rated at flows of ≤ 2.0 GPM (gallons per minute), toilets with ≤ 1.3 GPF, and faucets rated at ≤ 1.5 GPM were essential to reduce the water intake from the city's water system. All appliances in the house are to be ENERGY STAR® rated and approved, including Sub-Zero, Wolf, Viking, and Insinkerator kitchen appliances; Hunter ceiling fans; HVAC systems; and two Frigidaire washer and dryer sets. Wall and ceiling insulation, with continuous R-5 ratings and total values of R-13 and R-30 respectively, will be used to create the thermal envelope. All exterior windows will be ENERGY STAR-rated Marvin Ultimate Double Hung windows, with primed wood interior and clad exterior. These windows were chosen because they have U-Factors of ≤0.35 and will be installed to form a tight seal, which will prevent temperature variations around areas that are close to the windows. Compact fluorescent light bulbs (CFLs) will be installed in "high-use rooms," and an ENERGY STAR advanced lighting package is currently being considered for at least 60 percent of all the lighting fixtures. Carbon monoxide poisoning is a serious and grave threat to any homeowner. LEED for Homes requires that carbon monoxide detectors be installed on every floor.

One of the most important considerations when building a LEED-certified home is the creation of a good thermal envelope, which reduces the need for heating and cooling as well as the installation of highly efficient equipment to supply it. This measure is put into place so as to meet the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) standard for fresh air. An Energy Recovery Ventilator (ERV) will temper fresh air before it is distributed throughout the home. Expanded foam, rather than stuffed fiberglass batts, will seal all penetrations and openings, including those around every window frame. All light fixtures, electrical outlets, piping, and duct work will be properly sealed to combat air leakage. The HVAC system will use refrigerants such as Puron R-410 as opposed to traditional coolants, in order to minimize contributions to ozone depletion and ultimately global warming.

In order to further address indoor air quality, and to significantly cut down on dust particles and dirt inside the townhouse, the development team made



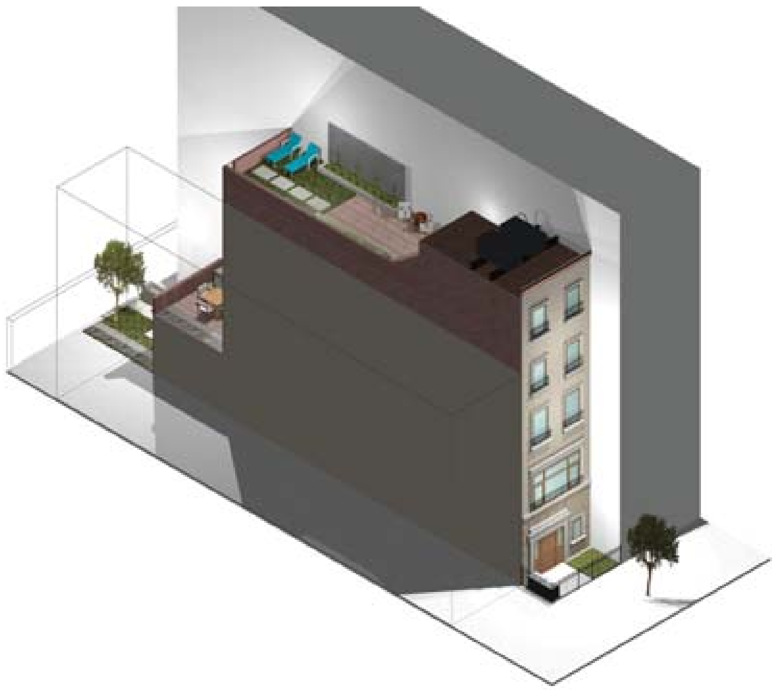
some important design decisions. The installation of a DuraVac central vacuum system is a contaminant control strategy in the Environmental Quality (EQ) category on the LEED for Homes ratings system, which earns the project a point toward the projected LEED Gold certification. The decision to install wood flooring throughout the house and eliminate wall-to-wall carpeting is an important design element intended to keep the house cleaner and dust free. Shoe storage (two pairs of shoes per bedroom) was built into the mud room, aside the main entry foyer, in order to encourage inhabitants to remove their shoes upon entry into the townhouse.

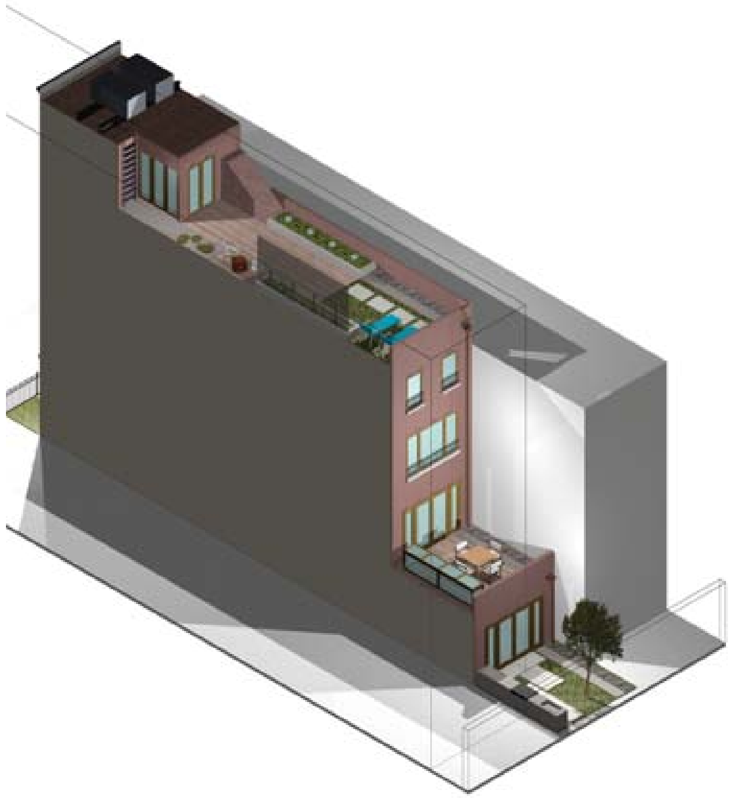
Heatilator gas fireplaces with roughly half of the BTUs recommended to heat the rooms, which they occupy, were chosen instead of wood burning fireplaces. The gas fireplaces will be direct vented and will have permanently fixed glass doors and electronic pilots minimizing the leakage of combustion gases into the home. The elimination of wood burning fireplaces will also decrease the amount of fine particulates in the air and contribute to the indoor environmental quality.

During the construction process, the general contractor (yet to be selected) must comply with LEED for Homes waste management criteria. On this project the general contractor is responsible for diverting waste generated on the construction site to landfills and/or incinerators by confirming that the waste hauler is recycling and/or reusing up to 88 percent of the construction site waste. This will earn the project three more points in the waste management category toward the anticipated LEED for Homes Gold rating. The general contractor must produce no more than 0.5 pounds per square foot of construction waste after the demolition process. It is essential that in the demolition process they develop a list of materials to be targeted for reuse and recycling. The general contractor must provide LEED for Homes with tipping receipts, landfill information, and sorting methods for all items removed from the construction site.

During construction there are a number of non-standard building methods, which LEED for Homes would like the general contractor to follow. In order to address pest control in a non-toxic way, the team is using concrete foundation walls and keeping all wood used for the construction of the house at least a foot above the soil line. All cracks, joints, penetrations, edges, and entry points of the building will be sealed and capped. Rodent- and corrosion-proof screens will be installed on all openings such as air intakes, exhausts, and drain pipes. And finally, all exterior wood-to-concrete connections will be separated with metal or plastic fasteners.

Mac Carbonell from Verdant Garden Design, a Brooklyn, New York-based





landscape architect, has significant experience and knowledge in the green roof and LEED-certified field. Mac and team recently designed a hanging garden system for the "Flowerbox Building," a ground-up condominium building in Manhattan's East Greenwich Village. Proper landscaping and rainwater runoff control needs to be carefully planned. To control the path of rainwater runoff during construction, silt fencing will be installed along the perimeter of the building and the outdoor spaces. Permeable stone and walkway material will be used to counter the natural pooling of water and the build-up of potentially heavy flows, which could easily damage plant life. Non-invasive and drought-tolerant native plants were chosen to adorn the three outdoor spaces, in conjunction with simple flagstone and gravel along the patio space. A rainwater harvesting system is being designed with dual purposes in mind. First, aesthetically as a reflecting pond along the west portion of the outdoor spaces, which all connect through a simple vertical drain pipe, and second, as a means to water the plants by using recycled rainwater instead of the city's tap water.

> "There have been plenty of new condominium and office buildings erected recently in Manhattan, which have had varying levels of LEED certification, but New York City has yet to see a single-family townhouse designed with the socially responsible consumer in mind."

Given the scope and parameters of this project, it has taken five to six months of careful planning and permitting to get to this point before the development team is able to begin the demolition process. The number of moving parts and complexity in a project such as this is much broader due to the groundbreaking LEED aspect as well as the fact that this is an urban infill site on the most densely populated island in the world. This is the development team's first project together, and the hope is that what they learn from this development process can be replicated on future Manhattan-based sites. The socially responsible, "green" building movement, combined with the evolution of sustainable design products and materials, will keep this evolving industry fresh and vibrant. "It is nice to be the first anticipated LEED-certified townhouse in New York City, but my hope is that this project raises the bar for townhouse construction and challenges others to build in a similar way," says Teddy Schiff. UHD

The Author

Teddy Schiff is the founder and President of Oyster Capital Group, a New York City-based residential real estate development firm specializing in urban infill projects with the high-end consumer in mind. Mr. Schiff has a Masters of Science in Real Estate Development graduate degree from Columbia University and a Bachelor of Arts undergraduate degree from Trinity College. For more information visit: www.oystercapitalgroup.com

A Far Less-Expensive, Green Alternative To Traditional Air Conditioning From QuietCool

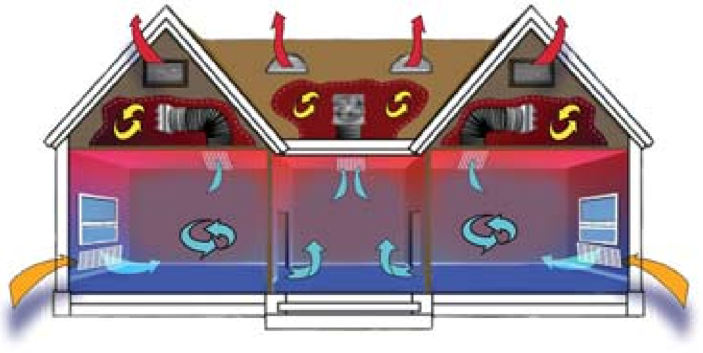
Homeowners using the revolutionary EnviroCool™ "The Fresh-Air Conditioning System" fresh air-cooling system report health benefits due to a reduction in indoor air pollution

Terry Oster

With the summer heating season under way and energy costs again on the rise, homeowners around the country are turning to a less-expensive and more environmentally friendly way to comfortably cool their homes.

QuietCool and EnviroCool

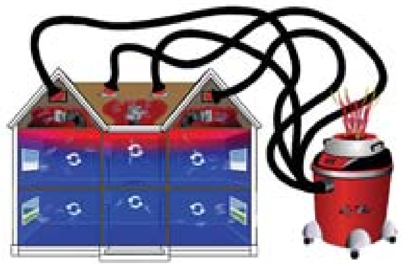
The QuietCool family of whole house fans and their companion product, EnviroCool™ evaporative cooling air systems, can save homeowners 90 percent off their air-conditioning electric bills, keeping homes comfortably cool for pennies an hour, even during the hottest parts of the day. Used together, these two products are saving homeowners thousands of dollars a year and are reducing their dependence on air conditioning, which can cost more than $5.00 an hour to run in some regions..



About QuietCool Whole House Fans QuietCool QC-1500

An innovative whole house fan, the QC-1500 is suspended in the attic roof rafters away from the ceiling. Connected to an attractive ceiling grill with a patented insulated flexible duct, it is whisper quiet and can be installed in less than a third of the time it takes to install a traditional whole house fan.

Unlike conventional air conditioning, QuietCool also ventilates homes, removing germs, odors, and indoor pollution and replacing it with healthier outside air. Picture a giant vacuum sucking out all the hot air trapped in your home and attic while replacing it with fresh natural cool healthy air for pennies an hour! These high-volume fans can remove and replace all of the air in your home 15 to 20 times per hour! With the American Medical Association linking indoor air pollution to a third of all illnesses, this air-purifying capability is becoming a vital consideration to homeowners.



QuietCool QC-4500

Called the Quiet Giant, the QC-4500 is capable of moving 4,500 cubic feet of air per minute and comes with two motors and ducts for maximum ventilation and cooling.

About The EnviroCool System

When you add the revolutionary EnviroCool system to your home, you can stay cool for about one tenth the cost of traditional air conditioning. By drawing the fresh air in through the EnviroCool high-tech space age media, the incoming filtered air is cooled by as much as 40 degrees and does it whisper quiet! An evaporative cooling mechanism used with QuietCool fans, EnviroCool can lower the temperature in homes far more efficiently than conventional air conditioners. EnviroCool is likely the most cost-effective "green" addition a homeowner can add, and one that could well increase a home's value and "sellability." Operating automatically on a thermostat, it installs at a fraction of the cost of a new air conditioner. Homeowners typically experience less than a two-year payback on the initial cost of their system.

About QuietCool, Inc.

A privately held company based in Winchester, California, QuietCool, Inc. specializes in developing and marketing environmentally friendly, simple-to-install cooling systems that save homeowners money and help the environment, while providing years of trouble-free service.

For More Information

Contact Terry Oster, Director of Sales and Marketing, 888 784 3826, 951 492 2039 or terry@quietcoolfans.com or info@FreshAC.com. Or simply visit www.FreshAC.com.

Purchasing Cabinets?
how about green?

Dick Titus

synopsis

- A key component to producing environmentally responsible cabinets is the presence of low-formaldehyde-emitting wood products; Buyers will want to make sure that the particleboard, plywood, and medium-density fiberboard in their cabinets are certified to meet low-formaldehyde emission standards.
- Consumers should look for cabinet manufacturers who use wood that comes from an independent and credible sustainable forestry program—a good program is one that uses best practices in its management system to ensure the current need for lumber is balanced with future needs and the health of the forest.
- The process of manufacturing can sometimes have harmful effects on the environment, but there are many things manufacturers can do to mitigate or even eliminate these effects.

No, it's not a bold aesthetic color choice. More and more consumers are taking into account the materials their home products—including cabinets—are made of and where they come from. When dangerous levels of formaldehyde were found to be emitting from the FEMA (Federal Emergency Management Agency) trailers of Hurricane Katrina victims in the Gulf Coast, the national spotlight turned to the issue of housing materials and indoor air quality as they relate to human health. Many "green" builders are dedicated to energy efficiency in housing, and many consumers appreciate its cost-saving benefits, but the importance of purchasing sustainable home products for the good of your family and the environment is gaining importance in the minds of many homeowners.

Getting A Handle On Emissions

There are several important factors that go into making a cabinet "green." A key component to producing environmentally responsible cabinets is the presence of low-formaldehyde-emitting wood products. Formaldehyde occurs naturally. It is produced by the human body and is a natural component of wood and other materials. It is deemed safe at low levels. It frequently is found in composite wood used in cabinets, furniture, and many other household products.

Buyers will want to make sure that the particleboard, plywood, and medium-density fiberboard in their cabinets are certified to meet low-formaldehyde emission standards. Also, at least 75 percent of the particleboard and medium-density fiberboard used in the cabinets should contain 100 percent recycled or recovered fiber content.

> "For ESP certification, manufacturers are awarded points through compliance in five categories: air quality, product resource management, process management, environmental stewardship, and community relations."

Consider The Source

Another item to keep in mind is the source of the wood used in your cabinets. Consumers should look for cabinet manufacturers who use wood that comes from an independent and credible sustainable forestry program. A good program is one that uses best practices in its management system to ensure the current need for lumber is balanced with future needs and the health of the forest.

Many sustainable forestry programs refer to the process for ensuring adherence to environmental standards as Chain-of-Custody (COC). It is the path that harvested raw materials take from a certified source, through the manufacturing process and on to the end product. In such programs, more trees are planted for every one that is harvested, and growers comply with federal, state, and local forestry laws and regulations. Different certification

programs may have different requirements, but all should exhibit a commitment to soil conservation and long-term forest productivity through practices like selective harvesting and minimal use of pesticides. Groups like the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), American Tree Farm System, Canadian Standards

Association, and Pan European Forest Certification Council, can provide resources for finding certified wood products as well as educate consumers on sustainable forestry.

In addition to their environmental benefits, the forests provide an excellent resource for many renewable wood products. Wood is a desirable material for "green" homes because it is both recyclable and biodegradable, with the added benefit of using less energy than metals or plastic in the manufacturing process.

Holding Up A Standard

Make sure to ask whether your kitchen cabinet manufacturer works with a certified sustainable forestry program and educates their hardwood suppliers regarding their purchasing preferences for certified hardwood lumber.

Getting the right wood products from a manufacturer you can trust amongst the myriad of options may be a daunting task. Many manufacturers utilize tools and guidelines that ensure sound environmental management and practices, while consumers are looking for a simple way to identify which manufacturers understand their commitment to sustainable living. Due to current trends in "green" building, manufacturers are eager to demonstrate to customers their commitment to the environment. To help consumers decide which manufacturers are living up to their word, they should look for certification from a reliable third-party organization.

In response to the need to identify credible manufacturers committed to protect the environment, the Kitchen Cabinet Manufacturers Association (KCMA) developed its Environmental Stewardship Program (ESP) in 2006. As the principal trade association in the United States for manufacturers of kitchen cabinets, bath vanities, decorative laminate products, and suppliers to the industry, the KCMA is committed to excellence in manufacturing through continued quality, advocacy, and leadership. Over 40 years ago, KCMA developed industry performance standards for cabinets recognized by the American National

Standards Institute (ANSI), which they have maintained and updated regularly in response to changes in materials and processes. The association now is taking the lead in adding environmental sustainability to its ANSI performance durability platform.

GREEN build

ESP is the only environmental certification program that specifically focuses on kitchen and bath cabinets. The program satisfies the Environmental Protection Agency's

ENERGY STAR®-New Homes Indoor Air Quality Package and is referenced in the National Association of Home Builders (NAHB) Green Building Standard. It is administered similar to the existing quality performance standard specified and maintained by the KCMA.

A Holistic Approach

Many of today's "green" consumers take a holistic view of their products. They look at the entire process from the initial growth and harvesting of raw materials through production of the end product. The process of manufacturing can sometimes have harmful effects on the environment, but there are many things manufacturers can do to mitigate or even eliminate these effects. Recycling programs for cardboard, plastics, wood, and solvents; tracking waste and documenting waste-reduction goals; and even recycling process by-products for alternative energy are all valid initiatives. ESP specifies that cabinetmakers should have a written Environmental Management System, where cabinetmakers evaluate and record their own efforts towards helping the environment and earn points necessary to earn ESP certification.

For ESP certification, manufacturers are awarded points through compliance in five categories: air quality, product resource management, process management, environmental stewardship, and community relations. There are 18 different criteria in the categories. All of the criteria require third-party verification. Any manufacturer of pre-finished, factory-engineered cabinets is eligible for participation. The certification process does not require tests; manufacturers must prove compliance through documentation and records, which are reviewed and confirmed by trained and experienced staff.

ESP awards certification annually to manufacturers who have earned at least 80 of a possible 105 points. This 80-point requirement allows for the diversity of factors that can affect different manufacturers' operations such as size, infrastructure, and location.

The maximum points for each category are as follows:

Air Quality	30
Product Resource Management	30
Process Resource Management	20
Environmental Stewardship	15
Community Relations	10

Manufacturers must receive points in all five categories to qualify for certification.

Good Stewards

While quality craftsmanship and materials affect the look of your cabinets, the manufacturer's values affect the world at

large. ESP is dedicated to sharing its knowledge of environmental and forestry issues with members and customers in the global wood products community. Manufacturers who in turn provide ongoing education and outreach to suppliers and encourage community involvement are awarded certification points. A written policy statement that affirms the manufacturer's commitment to environmental quality is a key part of compliance. Manufacturers should show that they have an Environmental Management System in place and that they maintain contact with their key vendors and contractors to review environmental practices and policies. The program also encourages a documented program promoting the use of renewable and recycled materials or products.

Another important component of the certification process is the manufacturer's proven responsibility toward the community through service or by supporting charitable organizations such as Habitat for Humanity, Boys and Girls Clubs of America, and local food banks. Good community relations are important to the health and success of any organization and give customers the assurance that they are doing business with a responsible manufacturer.

Look For The ESP Seal

Once certified, manufacturers are permitted use of the ESP seal on their products.

When choosing cabinets for your home, be sure to ask for ESP-certified cabinets with the ESP seal. More and more cabinet manufacturers are seeking certification, which makes finding ESP-certified brands easier every day.

Currently, 105 plants and brands are certified by the KCMA Environmental Stewardship Program. For an up-to-date list of these manufacturers, go to the Certified Companies page at www.greencabinetsource.org.

To find dealers and showrooms that sell market ESP-certified cabinets, search online or in your telephone directory. You can also acquire about environmentally sound cabinets directly through your home builder or remodeler, as well as through various retailers.

For more information about KCMA and the Environmental Stewardship Program, visit www.greencabinetsource.com. UHD

The Author

Dick Titus has over 30 years of experience in association management. He was named Executive Vice President of the Kitchen Cabinet Manufacturers Association in 1980. As Executive Vice President, he oversees the operation of the association.

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Green Builders Embrace:
central vacuum systems, indoor air quality, power, and convenience

Bill Brewer

Beam Serenity QS.Power Unit and Beam Q Power Team

Beam Q Electric Power Brush

synopsis

- Building a green home not only involves adding features that conserve energy and improve air quality, it also means making homes more convenient and functional.
- Eliminating dust, pollen, and pet dander from the home is critical to the estimated 60 million Americans who suffer from allergies and asthma.
- Because of its deep-cleaning capability, using a central vacuum system can help reduce energy usage because the home will need cleaning less frequently.

A Sound Investment

For Matt Belcher, building a green home not only involves adding features that conserve energy and improve air quality, it also means making homes more convenient and functional. Central vacuum systems deliver on all counts, which is why central vacuum systems come standard in Belcher's custom homes.

"From a sales' perspective, homeowners like it because it's built-in, a part of the house," says Belcher, President of the Homebuilders Association of St. Louis and Eastern Missouri, and one of the nation's leading green builders. "It helps to promote good indoor air quality and health."

Belcher, who chaired the 2007 National Green Building Conference in St. Louis, also constructed three Vision Houses that served as demonstration sites for the event. The homes showcase the latest building products and practices that conserve energy and forestry resources, control moisture, and improve indoor air quality. The new Beam Serenity QS Central Vacuum System addresses indoor air quality in three ways:

- With up to 640 air watts of cleaning power, the system captures as much as five times more dust and allergens than a conventional vacuum.
- One-hundred percent of the contacted dirt and allergens are removed from the living area to a collection receptacle at the base of the motor.
- No air is blown into the room to stir up dust as the system's motor is outside the living area, usually in a garage or basement.

KickSweep Automatic Dustpan

Healthier Living

Eliminating dust, pollen, and pet dander from the home is critical to the estimated 60 million Americans who suffer from allergies and asthma. In fact, a clinical study of allergy patients found that using a Beam Central Vacuum System reduced each of the seven major symptoms of allergic rhinitis by as much as 61 percent.

Since the study, central vacuum systems have been recommended or required by numerous green building programs and healthy home demonstrations. Among them are the U.S. Green Building Council's LEED® for Homes, the American Lung Association®'s Health House® demonstration program, and numerous home builder association green building programs, including the two largest: Atlanta's EarthCraft House® and Denver's Built Green Colorado.

The St. Louis area has been cited by the Allergy and Asthma Foundation of America as being one of the most allergic communities in the U.S. So, Belcher says the indoor air quality benefits of central vacuums have struck a cord with his customers.

"Younger people appreciate the environmental stewardship and healthy living, and the empty nesters like it because of the easier maintenance and healthier lifestyle," observes Belcher.

Because of its deep-cleaning capability, using a central vacuum system can help reduce energy usage because the home will need cleaning less frequently. An added benefit is that the central vacuum system gets regular use, unlike many of the other green features of a home that are belowground or hidden inside walls. "It's a tangible benefit of owning a green home," he says.

Added features create even more appeal. Belcher says his customers particularly like the VacPan Automatic Dustpan. It installs in the toe kick of a cabinet or at the base of a wall. The user simply sweeps debris to the front of the VacPan, presses the toe switch and the central vacuum system pulls the debris away.

Larry Hartley, Vice President of Marketing for Electrolux Central Vacuum Systems, which manufactures Beam products, notes that Belcher is among a rapidly growing group of custom builders who have embraced central vacuum systems. A recent National Association of Home Builders' (NAHB) survey found that nearly one third of all luxury homes and 15 percent of "move-up" homes built in 2006 were equipped with central vacuum systems or had been primed for them.

"Builders are responding to consumer expectations for more built-in convenience and a healthy living environment," Hartley adds.

> "...central vacuum systems have been recommended or required by numerous green building programs and healthy home demonstrations."

Although most central vacuum systems are installed in new homes, Hartley adds that virtually any existing home can be retrofitted with a system starting at around $1,000. UHD

The Author
Bill Brewer is Senior Vice President and Director of Public Relations for ZLR*IGNITION* and serves clients in building products industries.

Working With National Green Standards Programs When Building Or Remodeling The Fireplace

Jim Plucker, Architectural Services Manager, Hearth And Home Technologies

According to the U.S. Department of Energy (DOE), a wood burning fireplace can exhaust as much as 24,000 cubic feet of air per hour to the outside, which in turn draws in cold air from the outside through the home's doors and windows. And since older wood burning fireplaces are only -15 to +15 percent efficient, the DOE considers them one of the most inefficient heat sources a homeowner can use.

Combining that information with the current rise in consumers' desires to "go green" in their building practices makes the hearth a key "green" area of the home. When it comes to fireplaces, national green programs, like the National Green Building Standard™, are quite consistent. Most green programs suggest a direct vent gas fireplace. In fact, some studies show that converting to a fireplace insert can increase efficency by up to 85 percent. In addition to the home-energy savings, fireplace-remodeling projects add to the beauty of a home, often increasing its value as well.

Traditional masonry fireplaces often emit smoke that can reduce the quality of indoor air, another concern for those determined to build their new home or conduct a green remodeling project. For that reason, in addition to the increase in energy efficiency, the Environmental Protection Agency (EPA) recommends installing an EPA-certified wood burning fireplace, stove, or insert; or a direct vent gas fireplace, stove, or insert. Pellet stoves are also to be considered when going "green."

Gas Fireplace Inserts

Fireplace inserts come in a variety of shapes and styles to fit the décor of any home. Operating at a flip of a switch, gas fireplace inserts offer the greatest level of convenience. Gas fireplace inserts consist of a gas log set installed in a steel or ceramic-molded firebox, with two flexible vent pipes that run to the outside through the existing chimney. Many units have fans to assist heat movement into the room and are available with wall-mounted thermostats or remote controls, so anyone can program them for automatic operation.

When considering a gas fireplace insert, consumers should look to A.F.U.E.- (Annual Fuel Utilization Efficiency) rated direct vent gas fireplace inserts as the smartest choice. A.F.U.E.-rated fireplace inserts are tested to the same standard as furnaces.

Direct vent gas fireplace inserts achieve greater heating efficiency than a wood burning fireplace because they feature a sealed combustion system. This means that 100 percent of the combustion air necessary to produce a flame comes from outside the home through a direct vent pipe, eliminating the heat loss associated with conventional chimneys. Up to 85 percent of the heat that direct vent gas fireplace inserts generate remains in the house. In addition, the direct vent pipe expels 100 percent of the fire's combustion exhaust outside the home, protecting indoor air quality. In fact, the American Lung Association states that direct vent appliances are the healthiest hearth choice a consumer can make.

Due to their high efficiency, direct vent gas fireplace inserts can pay for themselves in a matter of a few years through lower heating bills.

Pellet-Burning Fireplace Inserts

Pellet-burning inserts continue to gain favor with homeowners because they can cost as little as $3.00 to provide 24 hours of steady heat. Thanks to state-of-the-art technology, pellet-burning inserts are convenient, easy to use, and highly efficient. They require simply loading pellet fuel, such as wood pellets or corn, into the hopper and starting the unit. An automatic feed system delivers the pellets into the burn chamber.

According to the Pellet Fuels Institute, more than 600,000 homes in the Unites States and Canada use wood pellets as an economical and environmentally friendly heat source. Made from 100 percent wood sawdust, wood pellets rose to fame during the 1970's energy crisis. Since then, numerous pellet stove and pellet fireplace insert manufacturers have emerged to meet the growing demand for this clean, cost-effective heat source.

Wood pellet fuel provides multiple benefits. Perhaps the most attractive being a highly economical means to heat a room or home. A 40-pound bag of pellet fuel costs $3.00 to $5.00 each and can provide up to 24 hours of steady heat. On average, a winter's supply of wood pellets is about 100 to 150 bags—depending on climate and lifestyle variations. And when compared to the price fluctuations of electricity, gas, and oil, the price of a 40-pound bag of wood pellets has remained virtually the same over the past decade.

By burning cleaner than virtually any other fuel, wood pellets also help reduce air pollution. For example, the particulate emissions from a pellet stove are approximately 1.2 grams per hour compared to 7.5 grams per hour for a typical wood stove. Additionally, after burning wood pellet fuel, little ash is left over, reducing clean up. And wood pellets produce virtually no creosote—a major cause of chimney fires. Wood pellets also reduce the burden on landfills by creating commercial demand for sawdust, which would otherwise be considered waste. Perhaps best of all, wood pellets are a renewable energy source, unlike oil and gas.

Installation Considerations

Gas, pellet-burning, and wood burning fireplace inserts range in price from $1,399 to $2,599; for those that do not want a real flame or have venting issues, an electric fireplace insert can be purchased for under $500.00.

It is highly recommended that a factory-trained professional perform the installation to ensure accordance with local and national building codes. Installation costs vary widely, depending on each homeowner's circumstances and location; however, $800 to $1,100 is an average range. This includes obtaining a gas permit, if necessary, and labor. The hearth experts at Fireside Hearth & Home suggest that summer is actually the best time to select and install an efficient hearth solution like a pellet stove, to escape next season's high heating bills.

"Waiting until the fall or winter to address high heating bills can be a costly mistake," says Joel Ginsberg, Division Manager, Fireside Hearth & Home. "Demand for hearth products and installation skyrockets in cooler months, often exceeding supply. If you were in the market for a hearth product last winter, you may have found yourself facing long delivery and installation delays—especially if you were seeking a high-efficiency product."

Innovation For Best Green Practices

Fireplace Features That Reduce Fuel Consumption

- IPI (electronic ignition) saves homeowners $10 to $12 a month in fuel costs used by an old-fashioned standing pilot light. That's $840 to $1,000 over the seven years that consumers, on average, stay in a particular home.
- A variable flame feature can control flame height, should the room become too warm.

High-Efficiency Fireplaces And Features

- A.F.U.E.-rated fireplaces are more energy efficient and have the certification to prove it.
- Ceramic-molded refractory or liner radiates more heat energy into the room and looks great.

Tips For Warmth Without Waste

- In cold climates, use the efficient fireplace to heat the space you are using while keeping your furnace thermostat on a much lower setting. This zone heating practice saves whole-house energy use by warming just the living areas while maintaining the rest of the house at a lower temperature. An average direct vent gas fireplace uses 30,000 BTUs per hour, while a whole-house furnace averages 100,000 BTUs. By zone or space heating, you can significantly reduce your energy usage.
- Hybrid heating systems for temperate climates combine a gas fireplace in the main living areas with electric baseboard heating in the rest of the house. A well-insulated home allows the heat of the efficient gas fireplace to warm the living areas of the home while delaying the use of costlier electric heat for the coldest parts of winter. This saves the cost of a furnace, as well as whole-house heating costs.
- There isn't a simpler way for a hearth system to avoid a venting problem and maintain best practices than with an electric fireplace. And, if the flame technology uses LED lighting, you've got an innovative energy-saving feature combined with the indoor environmental quality of the electric hearth. Although not a substantial heater, an electric fireplace is a great solution when other fuels are not practical or if venting is a challenge.

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